DOE/EA-0404

ENVIRONMENTAL ASSESSMENT

INNOVATIVE CLEAN COAL TECHNOLOGY PROGRAM
COKE OVEN GAS CLEANING DEMONSTRATION PROJECT

BETHLEHEM STEEL CORPORATION
SPARROWS POINT PLANT
BALTIMORE COUNTY, MARYLAND

DECEMBER 1989

U.S. DEPARTMENT OF ENERGY
ASSISTANT SECRETARY FOR FOSSIL ENERGY

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ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
AMA	Air Management Administration
avg.	average
BAT	Best Available Technology
BSC	Bethlehem Steel Corporation
Btu	British thermal unit
CAA	Clean Air Act
°C	degrees Celsius
CCTDP	Clean Coal Technology Demonstration Program
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
cm	centimeter
CO	carbon monoxide
CWA	Clean Water Act of 1987
d	day
dBA	decibels on the A-weighted scale
diam	diameter
DOE	(U.S.) Department of Energy
EA	Environmental Assessment
EPA	(U.S.) Environmental Protection Agency
ERM	Environmental Resources Management, Inc.
FR	*Federal Register*
°F	degrees Farenheit
FEMA	Federal Emergency Management Agency
ft	foot
FWS	(U.S.) Fish and Wildlife Service
gal	gallon
gpd	gallons per day
gpm	gallons per minute
h	hour
ha	hectare
H_2S	hydrogen sulfide
H_2SO_4	sulfuric acid
ICCT	Innovative Clean Coal Technology
in.	inch
kg	kilogram
km	kilometer
kWh	kilowatt-hours
L	liter
lb	pound
m	meter
m^3	cubic meter
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources

μg	microgram
mg	milligram
mL	milliliter
μm	micron
MWh	megawatt-hours
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NH_3	ammonia
NMFS	National Marine Fisheries Service
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
O_3	ozone
ORNL	Oak Ridge National Laboratory
Pb	lead
PEIA	programmatic environmental impact analysis
PM_{10}	particulate matter less than 10 microns in diameter
PON	Program Opportunity Notice
ppm	parts per million
scf	standard cubic feet
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
USGS	U.S. Geological Survey
VOC	volatile organic compounds

SUMMARY

This Environmental Assessment (EA) has been prepared by the U.S. Department of Energy (DOE), in compliance with the National Environmental Policy Act, to evaluate environmental issues associated with a project that will be cost-shared by DOE and private industry under the Innovative Clean Coal Technology Program. The proposed action is a coke oven gas cleaning technology demonstration project proposed to be installed and operated at the Bethlehem Steel Corporation, Sparrows Point Plant, in Baltimore County, Maryland. Alternatives to the proposed action, which include no action, delayed action, and the use of alternate sites or technologies, are discussed in this EA.

The impact analysis documented in this EA has concluded that no significant environmental impacts would result from the proposed demonstration project at the Sparrows Point site. The following points support this conclusion.

- The project would be installed and operated at an existing industrial facility in a previously disturbed location.

- The proposed coke oven gas cleaning technology would reduce atmospheric emissions of sulfurous compounds from the plant because the entire coke oven gas stream would be desulfurized, rather than only 60% of the stream that is cleaned by existing technology. The Sparrows Point Plant has received an Administrative Consent Order from the state of Maryland with regard to its violations of the state's "no visible emissions" regulation. The proposed action would improve local air quality and would enable the facility to attain its air quality permit requirements and the state regulations.

- Wastewater streams from the proposed system would reduce pollutant loadings of cyanide, ammonia, and phenols to the Coke Works biological treatment plant, which would improve treatment plant operating conditions. Discharges of effluent to Baltimore Harbor from the treatment plant would be in accordance with the National Pollutant Discharge Elimination System permit limitations. Existing effects on aquatic biota in the receiving waters would not be changed by the proposed project, because the characteristics of the existing effluent would either improve or remain unchanged.

- The groundwater in the confined Patuxent aquifer at the proposed project site is a potable supply and, therefore, a significant environmental resource. It would not be affected by the proposed project, because it is geologically isolated from the upper unconfined aquifer and therefore from surface contamination via spills and runoff. The unconfined aquifer, though not as important a resource in the region, would not be significantly impacted by project activities, because coke oven gas cleaning operations would be similar to existing operations and would be conducted in paved areas in which runoff and spills would be collected for treatment.

- The proposed site is not located within a wetlands or floodplain.

- The proposed project would not generate a significant amount of additional solid wastes at the Sparrows Point Plant.

- No threatened or endangered species would be affected by the project.

- The proposed action would be consistent with Maryland's Coastal Zone Management Plan.

- The proposed project would marginally and temporarily benefit the local economy because of its labor and materials requirements and expenditures. Because no influx of workers would be necessary in the heavily populated Baltimore region, the local population and infrastructure would not be affected. The project would not affect existing transportation networks and flow in the region.

- The installation of equipment and operation of the demonstration technology at the Coke Works would not alter the character of the Sparrows Point Plant to the degree that its eligibility for the National Register of Historic Places would be affected. DOE has consulted the State Historic Preservation Officer with regard to site eligibility and has been advised that there will be no adverse effect.

- Noise from installation of the new equipment and vehicle operation would be temporary, and levels would be greatest inside plant buildings. Because the project location is about 2 miles from the nearest residential area, no noticeable impacts from changes in noise levels at the plant would be expected.

1. INTRODUCTION

In compliance with the National Environmental Policy Act (NEPA), this Environmental Assessment (EA) has been prepared by the U.S. Department of Energy (DOE) to evaluate the environmental impacts of a clean coal technology demonstration project that is proposed for cost-shared federal funding by DOE under the Innovative Clean Coal Technology (ICCT) program. The proposed action is a coke oven gas cleaning project to be conducted at the Bethlehem Steel Corporation (BSC), Sparrows Point Plant, in Baltimore County, Maryland.

1.1 BACKGROUND

In December 1987, Congress made funds available for the DOE ICCT Program by Public Law No. 100-202, An Act Making Appropriations for the Department of Interior and Related Agencies for the Fiscal Year Ending September 30, 1988. This act provided funds for the purpose of supporting cost-shared clean coal technology projects to demonstrate emerging coal utilization technologies that are capable of reducing atmospheric emissions of sulfur dioxide and oxides of nitrogen, and authorized DOE to conduct the ICCT program. On February 22, 1988, DOE issued a Program Opportunity Notice (PON) to solicit proposals for the conduct of the ICCT demonstration projects. The BSC proposal for a retrofitted coke oven gas cleaning system was selected for federal funding (along with 15 other clean coal technology proposals) from among 55 proposals received in response to the PON.

1.2 PURPOSE OF AND NEED FOR THE ACTION

The proposed action is intended to demonstrate the successful application of a practical, cost-effective coke oven gas cleaning technology that could be used by the U.S. coke-making industry to achieve compliance with environmental standards without replacing existing coke-making by-product facilities. The demonstration has been scaled to generate sufficient data from design, construction, and operation to enable private industry to assess the potential for commercial application of the technology.

This demonstration project is designed to achieve the objectives of the Clean Coal Technology Demonstration Program (CCTDP), of which the ICCT program is a part. CCTDP is a multi-phasic effort consisting of separate solicitations for clean coal technology projects (Fig. 1) intended to provide the U.S energy marketplace with an array of advanced, more

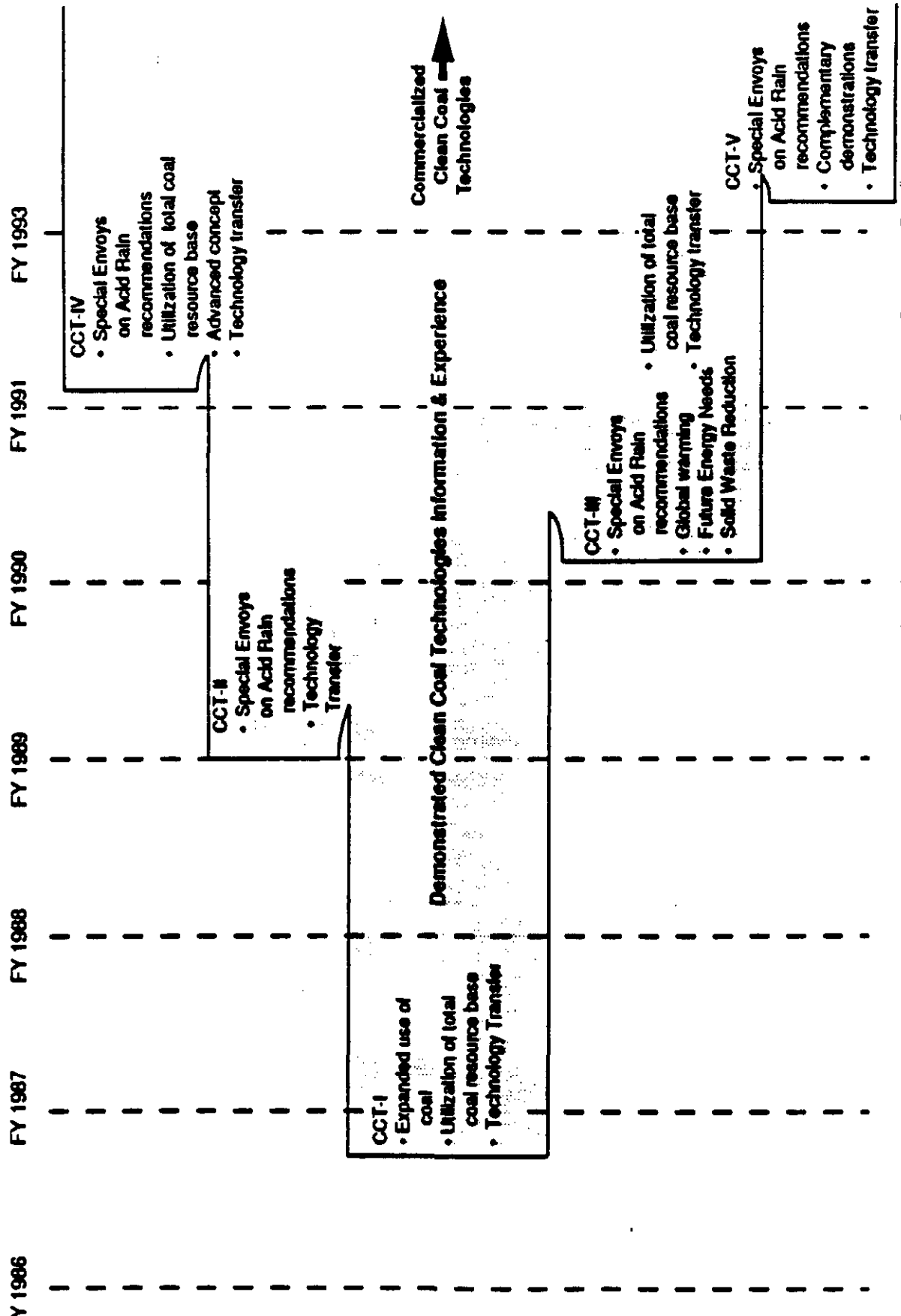

Fig. 1. Clean Coal Technology Program (CCT) strategy. *Source: Review Draft Environmental Impact Statement, Clean Coal Technology Demonstration Program*, DOE/EIS-0146D, U.S. Department of Energy, May 1989.

efficient, reliable, and environmentally sound coal utilization and pollution control technologies. The ICCT program, the second solicitation of the CCTDP, is intended to demonstrate technologies that are potentially more cost-effective than existing technologies and are capable of achieving significant reductions in sulfur dioxide (SO_2) and/or nitrogen oxide (NO_x) emissions from existing coal-burning facilities—in particular, those that contribute to acid rain and the issues of transboundary (U.S. and Canada) and interstate atmospheric pollution. The proposed action would reduce emissions of SO_2, cyanide, and volatile organic compounds (VOC) from the BSC Sparrows Point Plant.

1.3 NEPA STRATEGY

An overall strategy for compliance with NEPA was developed for the ICCT program, consistent with the Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508) and the DOE guidelines for compliance with NEPA (52 FR 47662, December 15, 1987). The strategy, which includes consideration of both programmatic and project-specific environmental impacts during and subsequent to the selection process, has three major elements.

The first element involves the preparation of a comparative programmatic environmental impact analysis (PEIA), based on information provided by the offerers and supplemented by DOE as necessary. The PEIA was issued by DOE as a public document (DOE/PEIA-0002) in September 1988. This environmental document analyzes the environmental consequences of the ICCT program and the technologies supported by the program compared with the "No Action" alternative. In the PEIA, the Regional Emission Database and Evaluation System was used to estimate the environmental impacts expected to occur in the year 2010 if each technology reaches full commercialization and captures 100% of its applicable market. The environmental impacts are compared with the "No-Action" alternative under which it is assumed that the use of conventional coal technologies would continue through 2010 with new plants using conventional flue gas desulfurization controls as needed to meet the New Source Performance Standards promulgated by the U.S. Environmental Protection Agency (EPA) (40 CFR Pt. 60) pursuant to the Clean Air Act (CAA). In addition, an analysis was made of the areas where environmental information was incomplete or unavailable and of the trade-offs between short-term uses and long-term productivity and the irreversible and irretrievable commitment of resources.

The second element of DOE's strategy for NEPA compliance involves the preparation of a pre-selection, project-specific environmental review based on project-specific environmental data and analyses that offerers supplied to DOE as a part of each proposal. This analysis contains a discussion of the site-specific environmental, health, safety, and socioeconomic issues associated with the demonstration project. It includes a discussion of the advantages and disadvantages of the preferred and alternative sites and/or processes reasonably available to the offerer. A discussion of the environmental impacts of the proposed project and a list of all permits that must be obtained to implement the proposal are included. The document describes options for controlling project discharges and for the management of solid and liquid wastes and assesses the risks and impacts of implementing the proposed project. Because this pre-selection, project-specific environmental review contains proprietary and/or confidential business information provided to DOE in the proposal, this document is not publicly available.

The third element of DOE's NEPA strategy provides for the preparation of site-specific NEPA documents for each project selected for financial assistance under the PON. After DOE's consideration of the evaluation criteria, the program policy factors, and the NEPA analyses, the proposal submitted by BSC was one of 16 selected for an award. This EA describes the proposed action at one of the ICCT project sites.

1.4 SCOPE OF THIS EA

This EA has been prepared in accordance with the CEQ regulations implementing NEPA and with DOE NEPA guidelines. The scope of the EA was decided after consideration of (1) the nature and extent of retrofit activities at the Sparrows Point Plant; (2) the incremental changes in the emissions, effluents, and wastes generated by the operation of the retrofitted facility; (3) and the change in resource requirements for the facility.

Because of the quantitative changes in atmospheric emissions and plant effluents, the EA describes the existing air and water quality in detail, and the impacts analysis correspondingly focuses on air and water quality. Physical changes to the plant would be undertaken in previously disturbed land areas. Therefore, the discussion of the existing terrestrial environment and land use and the discussion of impacts to these areas are less detailed than the discussions of air and water quality.

Continued commercial operation of the proposed coke oven gas cleaning system at the Sparrows Point Plant would result in the same impacts as the demonstration project; therefore, further impact analysis of commercialization is not provided in this EA.

During preparation of this EA, the following agencies and institutions were contacted.

- Maryland Department of the Environment
  - Air Management Administration
  - Hazardous and Solid Waste Management Administration
  - Water Management Administration
- Baltimore County Division of Air Pollution Control
- Maryland Department of Natural Resources
  - Water Resources Administration
  - Forest, Park, and Wildlife Services
  - Maryland Environmental Service
  - Tidewater Administration
- Maryland Department of Labor
  - Labor Statistics
- Maryland State Historical Society
- National Oceanic and Atmospheric Administration
  - National Marine Fisheries Service
- U.S. Fish and Wildlife Service
  - Northeast Regional Office
- University of Maryland Center for Environmental and Estuarine Studies
- Chesapeake Wildlife Heritage
- Chesapeake Bay Foundation

In addition, a site visit to the Sparrows Point Plant was conducted by DOE and representatives of Oak Ridge National Laboratory (ORNL), who prepared this document, and a meeting was held with the Maryland Air Management Administration.

2. THE PROPOSED ACTION AND ALTERNATIVES

2.1 PROJECT LOCATION

The proposed demonstration project would be located at the BSC, Sparrows Point Plant, in Baltimore County, Maryland. The plant is located on 3000 acres (1214 ha) of the Sparrows Point Peninsula, about 10 miles (22 km) southeast of downtown Baltimore. The general location of the plant is shown in Fig. 2. The coke oven gas cleaning demonstration project would be located on 8.6 acres (3.5 ha) at the existing "B" Coal Chemicals Plant at the Sparrows Point Plant Coke Works, which is on the southernmost portion of the plant site. Figure 3 provides an aerial view of the proposed project location as it relates to the entire Sparrows Point Plant.

2.2 PROJECT DESCRIPTION

2.2.1 Existing Operations

2.2.1.1 Manufacturing processes

Three basic steel manufacturing operations are carried out at the Sparrows Point Plant: (1) pyrolytic conversion of coal to coke (carbon) in coke ovens; (2) combination of coke, iron ore, and limestone in a blast furnace to produce iron; and (3) refinement of iron to steel in oxygen or open-hearth furnaces. In 1988, the Sparrows Point Plant produced 3.9 million tons of steel products.

The Coke Works at the plant consists of three operational coke batteries, "A," "11," and "12," and two Coal Chemicals plants, "A" and "B." The coke batteries supply metallurgical coke for chemical reduction of iron ore in the blast furnaces. Bituminous coal is heated in a coke oven in the absence of air to remove its volatile components. About 70% of the coal feed is converted to coke; the remaining 30% consists of by-product gases and vapors. These by-product gases are treated in the Coal Chemicals plants to recover usable and marketable

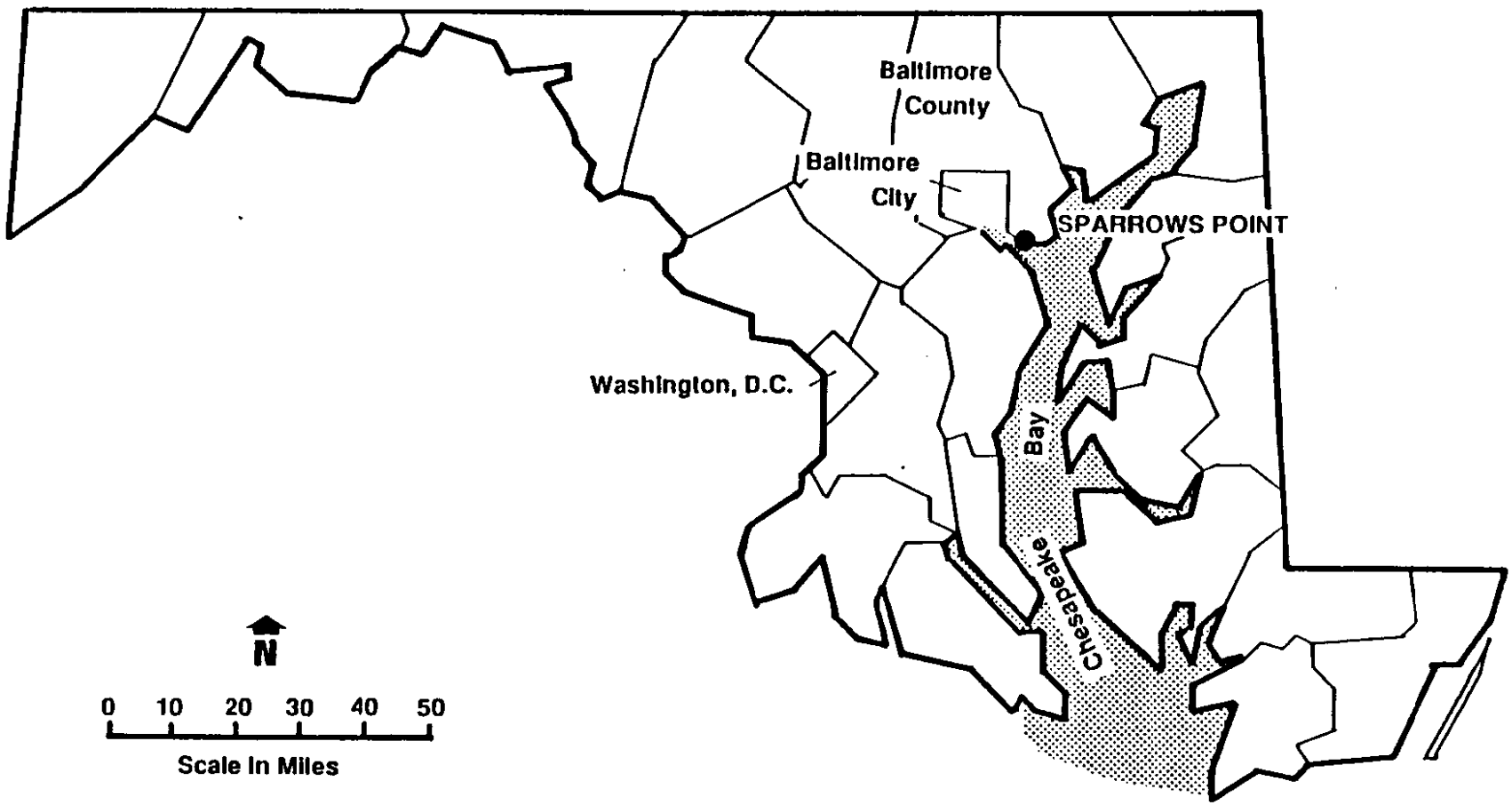

Fig. 2. Regional location of the Sparrows Point Plant in Baltimore County, Maryland. *Source:* "Environmental Information," *The Coke Oven Gas Cleaning Project at the Bethlehem Steel Corporation, Sparrows Point Plant,* Vol. 4, Environmental Resources, Inc., April 21, 1989.

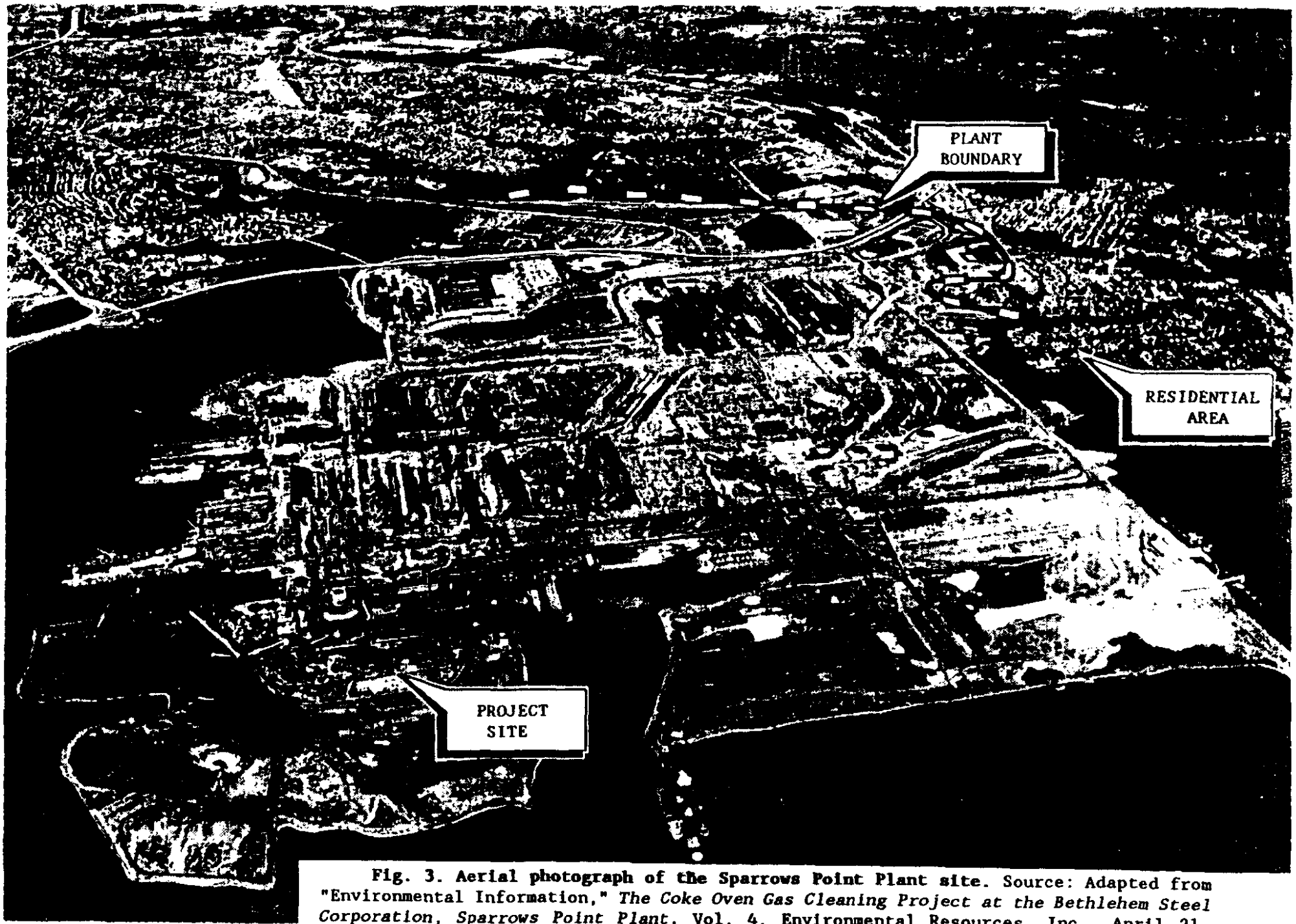

Fig. 3. Aerial photograph of the Sparrows Point Plant site. Source: Adapted from "Environmental Information," *The Coke Oven Gas Cleaning Project at the Bethlehem Steel Corporation, Sparrows Point Plant*, Vol. 4, Environmental Resources, Inc., April 21, 1989.

products, which include coke oven gas (used to fuel the ovens and furnaces within the plant), sulfur, coal tar, light oils, and ammonium sulfate.

2.2.1.2 Coke oven gas treatment system

The coke ovens currently consume about 5700 tons/d of coal and yield 4000 tons of coke and 67 million standard cubic feet (scf) of coke oven gas per day. Table 1 lists the typical chemical composition of the raw coke oven gas prior to treatment. The Coal Chemicals plants process the coke oven gas to recover 4.1 tons/d of sulfur; 43,000 gal/d of coal tars; 23,000 gal/d of light oils; and 36 tons/d of low-grade ammonium sulfate.

Table 1. Typical composition of the raw coke oven gas (by volume) prior to treatment in the Coal Chemicals plants at the Bethlehem Steel Corporation, Sparrows Point Plant

Hydrogen (H_2)	55[a] (%)
Methane (CH_4)	25
Nitrogen (N_2)	10
Carbon monoxide (CO)	6
Carbon dioxide (CO_2)	2
Volatile organic compounds[b] (VOC)	2
Ammonia (NH_3)	≤0.9
Hydrogen cyanide (HCN)	≤0.1
Hydrogen sulfide (H_2S)	≤0.5

[a]Numbers add up to more than 100% due to rounding.
[b]Includes benzene, toluene, and xylene.

Figure 4 is a flow diagram of the existing coke oven gas treatment systems in the "A" and "B" Coal Chemicals plants at the Sparrows Point facility. The figure indicates the major steps in the treatment process, which include primary cooling and tar removal, ammonia removal and recovery, final cooling, light oil recovery, and sulfur removal and recovery. The description that follows summarizes the processes in each step.

Coke oven gas from the "A" Battery is cleaned in the "A" Coal Chemicals Plant, while gas from the "11" and "12" Batteries is processed in the "B" Coal Chemicals Plant. In the first step

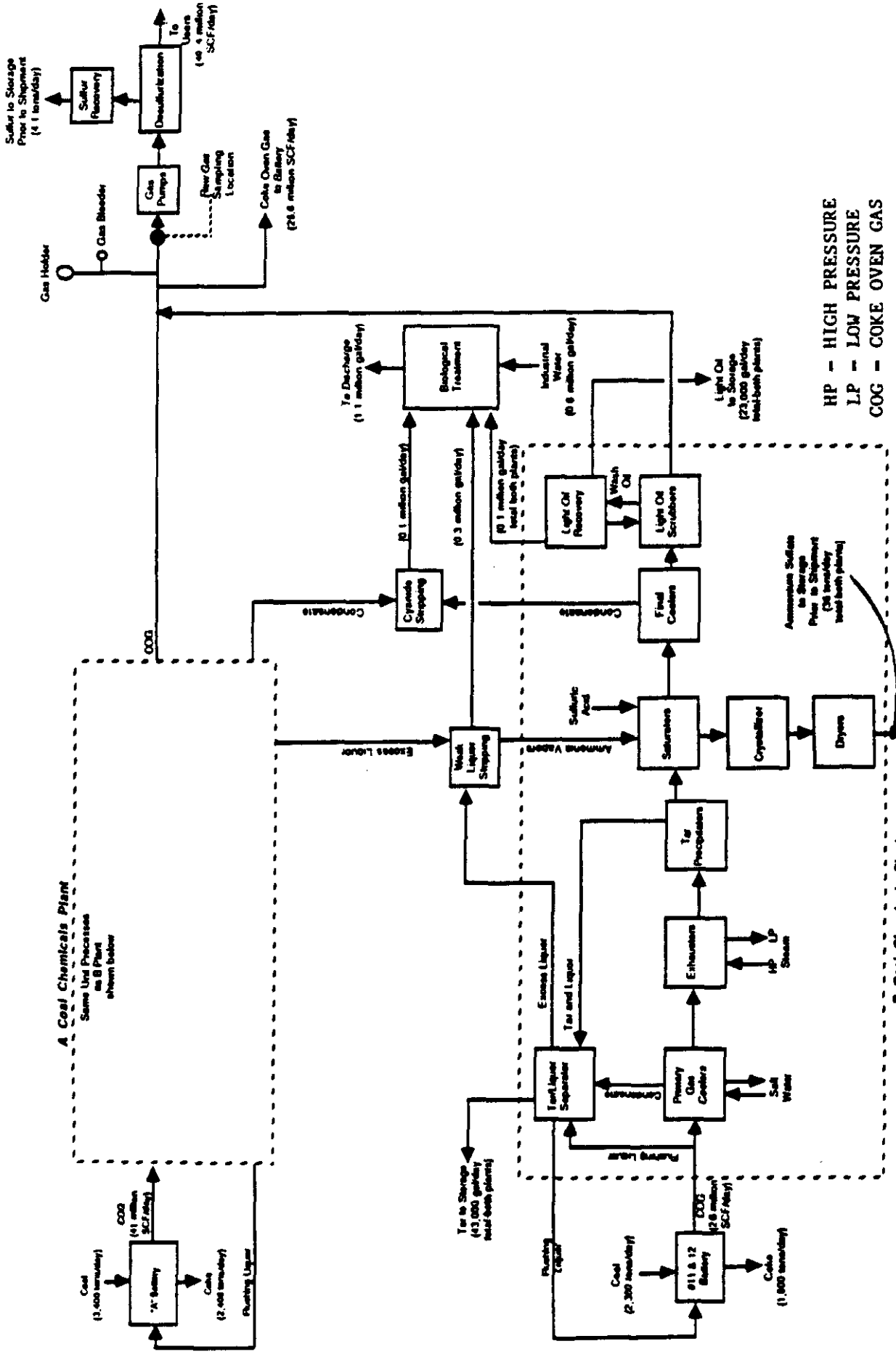

Fig. 4. Flow diagram for the existing coke oven gas cleaning processes at the Coal Chemicals Plants, Sparrows Point. Source: "Environmental Information," *The Coke Oven Gas Cleaning Project at the Bethlehem Steel Corporation, Sparrows Point Plant*, Vol. 4, Environmental Resources, Inc., April 21, 1989.

of the cleaning process, the crude gas leaves the coke oven chambers and is cooled by an ammonia (NH_3) flushing liquor spray in the oven off-takes. The NH_3 liquor acts as a medium for transporting the condensed tars and solids in the gas stream. Cooling removes additional tar and most of the water vapor and reduces the volume and temperature of the gas.

Any NH_3 formed during coke-making is partially removed during contact with the flushing liquor, and the remainder is removed by combining it with sulfuric acid (H_2SO_4). The reaction produces an ammonium sulfate solution, which flows to a crystallizer tank. Ammonium sulfate solids precipitate out as the solution becomes further saturated. The solid ammonium sulfate is removed and dried, then shipped off-site for sale.

The gas then flows from the saturators to a final cooler where benzol scrubbers remove benzene, toluene, and xylene, and a petroleum wash oil absorbs the light oils. Following light oil recovery, the gas streams from the "A" and "B" Coal Chemicals Plants are combined.

Forty percent of the combined gas stream is routed back to the coke oven batteries for combustion without sulfur removal. The remaining 60% proceeds to the desulfurizers. The existing desulfurizers use a vacuum carbonate system to scrub hydrogen sulfide from the gas. The hydrogen sulfide is recovered in a Claus unit where it is converted to elemental sulfur. The desulfurized coke oven gas is then transported throughout the steel plant for use.

To maintain the overall liquids balance, some of the recirculating flushing liquor is withdrawn from the system and is treated prior to discharge. This excess liquor is sent to the still and then to the biological treatment plant. In the ammonia still, which is located in the "B" plant only, excess flushing liquor is reacted with lime to convert all the NH_3 to a free form, which is then released by steam stripping. The NH_3 that is released joins the coke oven gas in the "B" plant after it leaves the electrostatic precipitators.

2.2.1.3 Emissions, effluents, and wastes

Existing operations at the Coke Works result in atmospheric emissions of various sulfurous compounds, NO_x, particulates, and VOCs from combustion of natural gas and treated coke oven gas and from manufacturing processes. In 1987, the Sparrows Point Plant was issued an Administrative Consent Order by the state of Maryland because of its violations of the "no visible emissions" and particulate matter standards (State of Maryland 1987). The coke oven battery stacks presently emit white plumes that result from condensing sulfate emissions. A discussion of the Order is provided in Sect. 5.1 of this EA.

Liquid wastes from all Sparrow Point Plant operations are treated at three on-site wastewater treatment plants and are discharged to Baltimore Harbor under a National Pollutant Discharge Elimination System (NPDES) permit. Influents to one of the plants, a biological wastewater treatment system at the Coke Works, include the ammonia still effluent, light oil recovery unit wastewater, and cyanide stripper effluent from the Coal Chemicals plants.

Solid waste generated by existing operations at the Coke Works includes nonhazardous sludge from the wastewater treatment plant (900 lb/d). The sludge is discharged to the Back River Sewage Treatment Plant via the plant sewer line. Also, the existing Claus sulfur recovery plant replaces spent alumina catalysts (2-3 tons) at 5- to 8-year intervals. The spent alumina is also nonhazardous and is disposed of in a state-permitted on-site landfill (Joseph Mendelson, BSC, personal communication with Andrea Campbell, ORNL, September 1, 1989).

2.2.2 Demonstration Project

2.2.2.1 Construction activities

The proposed project would be constructed on the site of the "B" Coal Chemicals Plant and would be laid out as indicated in Fig. 5. While the proposed project area is about 8.6 acres (3.5 ha), the area required for new equipment installation is much less. The demonstration equipment would replace the existing NH_3 removal system, final coolers, H_2S removal system, and sulfur recovery system in both the "A" and "B" Coal Chemicals Plants. The existing tar recovery system and one of two light oil recovery systems would continue to be used.

Significant downtime of the coke oven gas cleaning system is not expected during construction and start-up of the new system. The new equipment would be installed while the existing plant is operational, and tie-ins to the coke oven gas mains would be done by hot-tapping (a routine utility tie-in activity during which a special valve and flange are attached to an operational line to enable drilling and hookup to be performed without disturbing gas flow). Figure 6 shows how the existing equipment and new equipment would be used in the proposed gas treatment system.

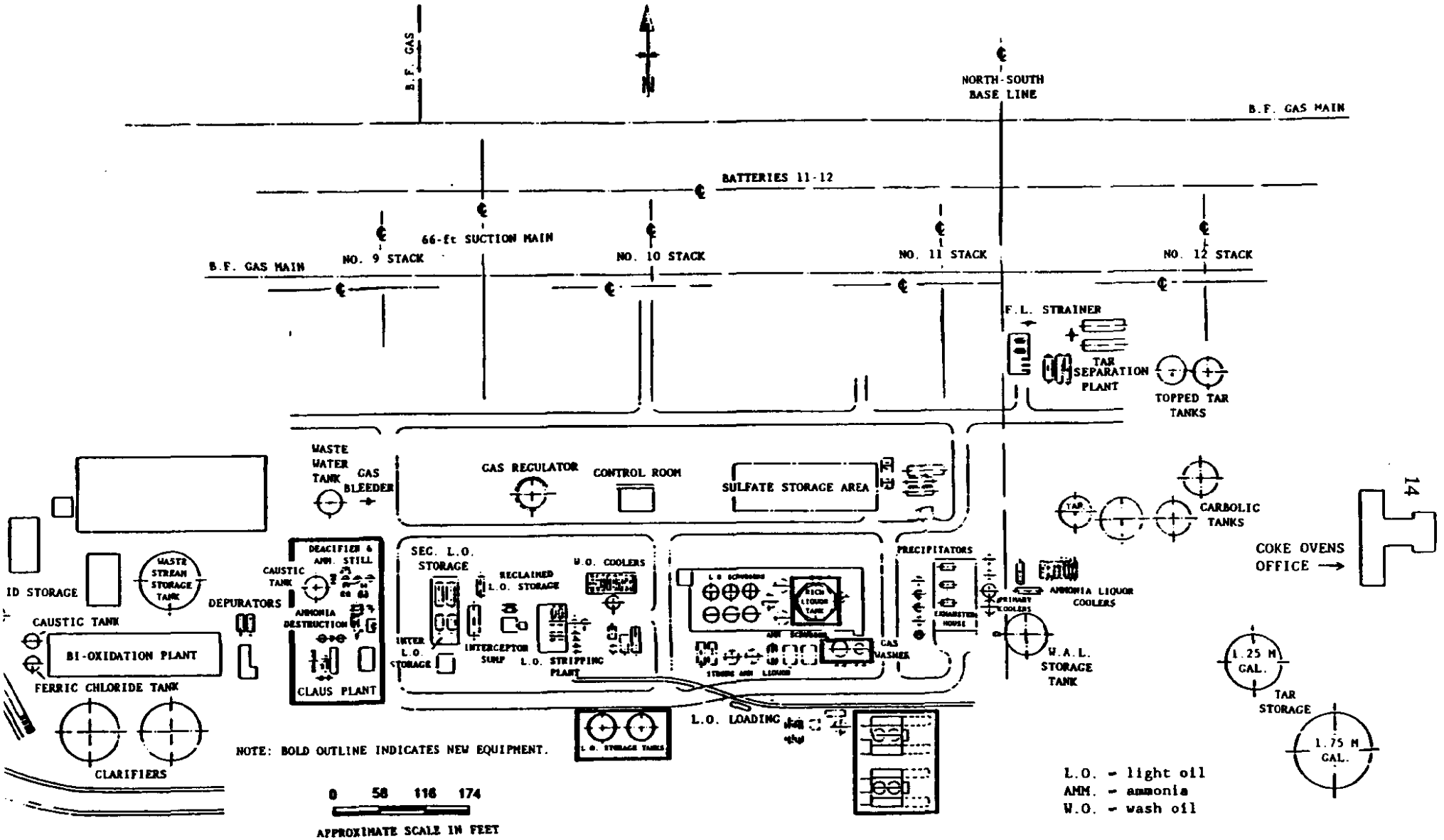

Fig. 5. Layout of new equipment to be installed as part of the coke oven gas cleaning demonstration project at the Bethlehem Steel Corporation, Sparrows Point Plant. *Source:* "Environmental Information," *The Coke Oven Gas Cleaning Project at the Bethlehem Steel Corporation, Sparrows Point Plant*, Vol. 4, Environmental Resources, Inc., April 21, 1989.

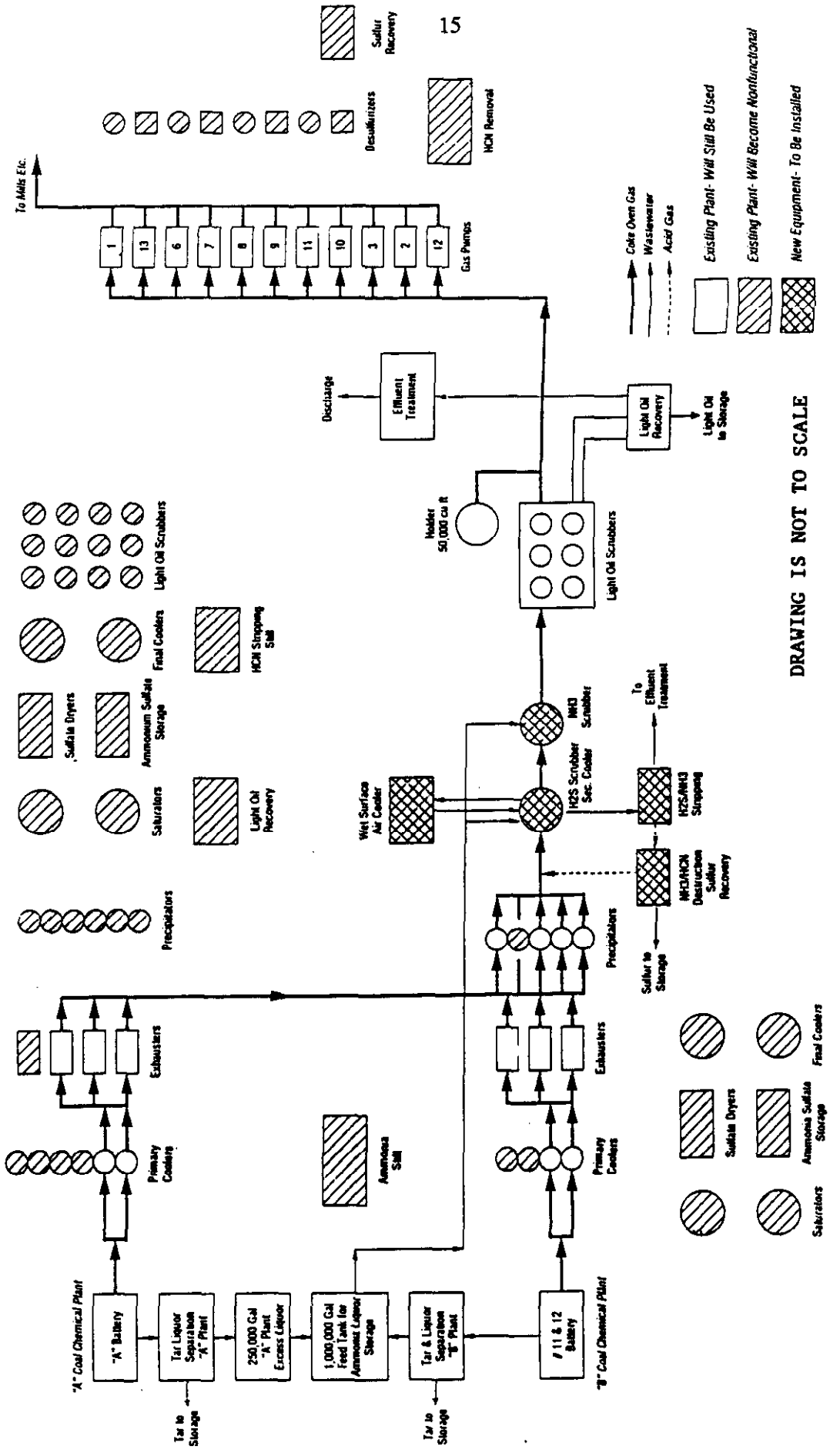

Fig. 6. New and existing coke oven gas cleaning equipment to be used in the Bethlehem Steel Corporation, Sparrows Point Plant, demonstration project. *Source:* "Environmental Information," *The Coke Oven Gas Cleaning Project at the Bethlehem Steel Corporation, Sparrows Point Plant*, Vol. 4, Environmental Resources, Inc., April 21, 1989.

2.2.2.2 Proposed coke oven gas cleaning process

The proposed technology consists of four steps: secondary cooling of the oven gas, hydrogen sulfide and ammonia removal, hydrogen sulfide and ammonia recovery, and ammonia destruction and sulfur recovery. Figure 7 is a flow diagram of the unit operations in the proposed gas treatment process.

The gas currently processed by both the "A" and "B" Coal Chemicals Plants would be treated. Coke oven gas from "A" Battery would proceed through primary cooling and the exhausters at the "A" plant and would then be combined with the coke oven gas from the "11" and "12" Batteries at the inlet to the tar precipitators. (The remainder of the "A" plant would not operate during the demonstration.) Following tar removal in the existing unit at the "B" plant, the gas would enter the demonstration plant sections.

The first new process would involve additional cooling to optimize the absorption of hydrogen sulfide in later steps. Cooling would be accomplished by direct contact with excess NH_3 flushing liquor containing 3 to 5% tar by weight. The cooled gas would then proceed to the hydrogen sulfide and ammonia removal process, which would involve treatment by gas-liquid contact in a series of scrubber columns.

In the H_2S scrubber, an ammonia-rich liquor would absorb the H_2S and convert it to ammonium hydrosulfide. The H_2S-scrubbed gas would then flow to the NH_3 scrubber where fresh flushing liquor and effluent from the ammonia still would absorb ammonia. From the ammonia scrubber, the cleaned gas would flow to the light oil recovery unit of the existing "B" plant. After light oils have been recovered, the cleaned gas would be transported throughout the plant for combustion.

The hydrogen sulfide and ammonia scrubbed from the gas would be recovered by stripping from the scrubbing liquor with low-pressure steam. The gases would then proceed to the ammonia destruction and sulfur recovery processes. In the ammonia destruction process, ammonia, hydrogen cyanide, and organics would be oxidized to form carbon monoxide, carbon dioxide, nitrogen, hydrogen, and water in the presence of a nickel catalyst at 2000°F. The gas would then be mixed proportionally with air to convert one-third of the H_2S to SO_2 prior to its flowing to the Claus sulfur recovery plant. In the Claus plant, the H_2S would react with SO_2 in the presence of an alumina catalyst to produce elemental sulfur. The remaining tail gas, which is expected to be only 4 to 5% of the total coke oven gas flow rate, would be recirculated to the coke oven gas stream ahead of the plant exhausters (see Fig. 7).

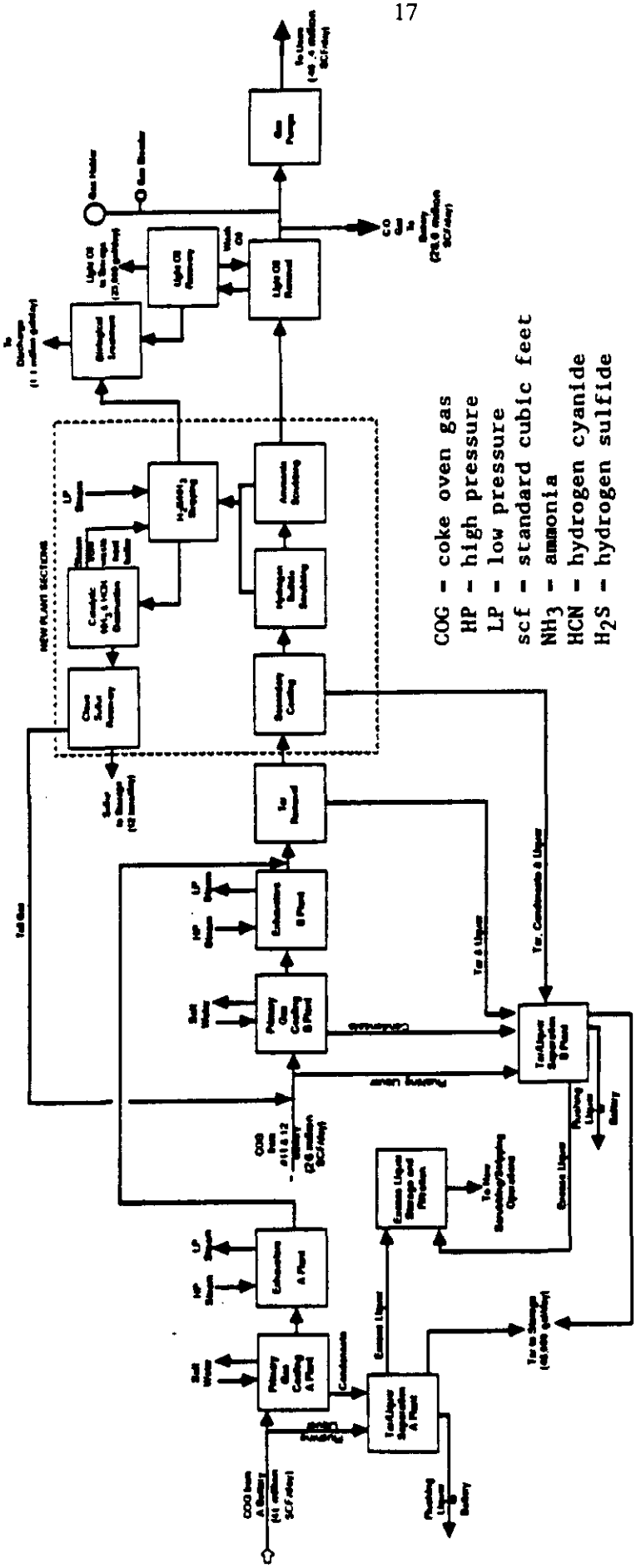

Fig. 7. Flow diagram of processes in the proposed coke oven gas cleaning demonstration project at the Bethlehem Steel Corporation, Sparrows Point Plant. Additions to the existing plant are illustrated within the dashed line. Source: "Environmental Information," *The Coke Oven Gas Cleaning Project at the Bethlehem Steel Corporation, Sparrows Point Plant*, Vol. 4, Environmental Resources, Inc., April 21, 1989.

2.2.2.3 Schedule

The demonstration project began in the spring of 1989 and will continue through the spring of 1993, a period of about 49 months. Three phases are anticipated: project design and permitting; procurement, construction, and start-up; and demonstration plant operation. BSC has already begun preliminary design work, which will be completed prior to the execution of the Cooperative Agreement with DOE.

Design and permitting are expected to be completed in the fall of 1989. Construction planning should be completed and actual construction would begin in the spring of 1990. The construction period is expected to continue for about 23 months thereafter, or until the spring of 1992. Operation of the demonstration project would follow; it would consist of a 12-month period during which a range of conditions would be employed to optimize the function of the coke oven gas cleaning system. There would be no significant downtime of existing plant operations during construction and start-up of the new system.

2.2.2.4 Resource requirements

The resource requirements for the proposed demonstration project are land, water, energy, and materials. These requirements are summarized in Table 2, which includes a comparison with raw material usage at the existing Sparrows Point Plant boundaries or beyond the current confines of the "B" Coal Chemicals Plant. Because the proposed modification involves a retrofit of new equipment into an existing process, no additional utility or other infrastructure would be required. There is no anticipated requirement for land outside the existing plant. The approximate plot areas required for the new equipment are as follows: hydrogen sulfide and ammonia scrubbers, 65 by 35 ft; wet surface air cooling system, 60 by 90 ft; hydrogen sulfide and ammonia recovery system plus ammonia destruction and Claus plant, 60 by 80 ft.

2.2.2.5 Emissions, effluents, and wastes

During normal operation of the new gas-cleaning process, atmospheric emissions of SO_2 and NO_x would result from combustion of the cleaned coke oven gas in process units and boilers throughout the plant. Nitrogen oxides emissions are expected to remain at 660 tons/year (0.1 lb/million Btu) because the proposed equipment would not alter the heating value or the fuel-bound nitrogen content of the product gas.

Table 2. Resource requirements for existing and proposed coke oven gas cleaning process at Bethlehem Steel Corporation, Sparrows Point Plant[a]

Resource	Existing plant	Proposed plant
Land	8.6 acres ("B" Plant only)	No change
Potable water	20,800 gpd	32,000 gpd
Industrial water	580,000 gpd	910,000 gpd
Patapsco River water	28.6 million gpd	21.6 million gpd
Electricity	121,000 kWh/d	106,000 kWh/d
Steam	58,158 pounds/h	No change
Natural gas	151 million Btu/d	77 million Btu/d
Alkali	6.2 tons/d of lime	3.9 tons/d of sodium hydroxide

[a]Average daily values are based on continuous operation (Btu = British thermal units; gpd = gallons per day; kWh = kilowatt-hours).

Total emissions of SO_2 resulting from combustion of coke oven gas are expected to be approximately 2600 tons per year (Table 3). This rate is based on (1) a projected hydrogen sulfide concentration in the coke oven gas of 70 grains/100 scf [1000 parts per million (ppm)], (2) an actual gas flow rate of 67 million scf/d, and (3) continuous operation. As Table 3 indicates, this rate represents a net reduction of approximately 6300 tons per year of SO_2 (71%) from 1986 emissions of 8900 tons [the last year prior to the issuance of an Administrative Consent Order (see Sect. 5.1)].

For both the existing and proposed systems, total SO_2 emissions are associated with four emissions sources: combustion of coke oven gas in coke ovens, combustion of coke oven gas as a plant fuel, combustion of Claus plant tail gas, and combustion of acid gases during Claus plant shutdown. The first two sources represent emissions from the two general processes that use the coke oven gas as fuel. The third source is the combustion of the remaining sulfur in the tail gas following desulfurization at the Claus plant. The final source, which is only applicable during a shutdown of the Claus plant, is the combustion of acid gases removed from the coke oven gas in a standby incinerator. With the existing system, this practice occurs approximately

Table 3. Comparison of annual SO_2 emissions from the existing and proposed coke oven gas cleaning system at the Bethlehem Steel Corporation, Sparrows Point Plant

Emissions source	Existing system (tons/year)	Proposed system (tons/year)	Net decrease (tons/year)
Combustion of coke oven gas in coke ovens	4438[a]	914[b]	3524
Combustion of coke oven gas as a plant fuel	2172[c]	1310[d]	862
Combustion of Claus plant tail gas	2[e]	0[f]	2
Combustion of acid gases during Claus plant shutdown	2285[g]	342[h]	1943
Total	8897	2566	6331

[a]Based on combustion of 26.6 million scf/d of un-desulfurized coke oven gas containing 340 grains/100 scf of H_2S.

[b]Based on combustion of 26.6 million scf/d of desulfurized coke oven gas containing 70 grains/100 scf of H_2S.

[c]Based on combustion of 40.4 million scf/d of desulfurized coke oven gas containing 110 grains/100 scf of H_2S as a plant fuel.

[d]Based on combustion of 40.4 million scf/d of desulfurized coke oven gas containing 70 grains/100 scf of H_2S as a plant fuel.

[e]Based on incineration of 2.7 million scf/d of Claus plant tail gas containing 1.3 grains/100 scf of H_2S.

[f]No emissions will occur because the unburned tail gas will be reinjected in the raw gas system.

[g]Based on combustion of raw coke oven gas in a standby incinerator during Claus plant outages. Current Claus plant availability is approximately 50% (i.e., the plant is not available 26 weeks per year).

[h]Based on combustion of raw coke oven gas in a standby incinerator during Claus plant outages expected 2 weeks per year for boiler inspections. The Claus plant is expected to be available 100% of the time during the other 50 weeks of the year.

50% of the time because of scheduled and unscheduled maintenance; with the proposed plant, the practice is expected for only 2 weeks of the year when the plant is off-line for boiler inspections. Unscheduled maintenance is not anticipated because the plant will be new.

Table 3 indicates that reductions are expected for each of the four SO_2 emission sources. Emissions from combustion of coke oven gas in coke ovens would decrease by about 3500 tons per year (79%) because, unlike present practice, this portion of the gas stream (40% of the total stream) would be desulfurized. Emissions from combustion of coke oven gas as a plant fuel would be lowered by over 850 tons per year (40%) due to increased efficiency in removing sulfur from the gas. Emissions from combustion of Claus plant tail gas would be eliminated because the unburned tail gas would be recycled to the raw gas stream. Because Claus plant outages are expected to occur much less frequently, annual emissions from the standby incinerator are predicted to decrease by almost 2000 tons (85%).

At a steel plant, VOC are emitted by the final coolers; these will be eliminated by the new process. In addition, the installation of the new system would result in a significant decrease in fugitive VOC emissions at Sparrows Point because of the shutdown of one of two light oil recovery units and the replacement of old, leaking equipment with new equipment.

Wastewaters produced during normal operation of the proposed project would contain ammonia, hydrogen sulfide, hydrogen cyanide, and phenols. During normal operating conditions, the new hydrogen sulfide and ammonia removal and recovery system would discharge 202 gpm wastewater to the existing treatment plant at the Coke Works. Its approximate composition would be 20 ppm hydrogen sulfide, 150 ppm ammonia, 200 ppm carbon dioxide, 10 ppm hydrogen cyanide, and 350 ppm phenols, on the basis of operating data from similar plants. The existing light oil recovery plant waste would contribute an additional 35 gpm of wastewater to this flow. Blowdown from the boilers and the wet surface air cooler would generate approximately 120 gpm of wastewater which would be discharged without treatment.

A small amount of routine solid wastes would be generated by construction activity. Larger volumes of construction by-products would be salvaged for scrap. Excavation during preparation of foundations for new facilities would remove several hundred cubic meters of old construction fill (slag). This material would be stockpiled for reuse in future construction projects. Several existing tanks and associated piping would be taken out of service and salvaged for scrap (Joseph Mendelson, BSC, personal communication with W. P. Staub, ORNL, May 11, 1989).

Operation of the proposed system would not generate solid waste on a routine basis. The characteristics of the sludge from the biological treatment plant would not change as a result of the new process, because contaminant loadings to the treatment plant would either decrease or remain the same. As is the current practice, a portion of the sludge would be recycled to the aeration tank and the balance discharged to the Back River Sewage Treatment Plant. The new Claus sulfur recovery plant would generate a spent alumina catalyst (as does the existing operation) and a spent nickel catalyst from ammonia/cyanide destruction. About 5 tons of spent nickel catalyst will be generated every 5 to 8 years. Waste management procedures are discussed later in Sect. 4.10 (Solid Waste).

2.3 ALTERNATIVES TO THE PROPOSED ACTION

Alternatives to the proposed action were considered through all three elements of the NEPA strategy as discussed in Sect. 1.3. No action was considered in the programmatic analysis, as well as in the preparation of this document. Delayed action was considered primarily here, although it was also considered in the pre-selection review. Consideration of alternative sites and alternative technologies for the CCTDP was incorporated into the pre-selection review. Alternative sites and technologies for this particular proposed action were considered in the preparation of this document. A brief summary of the alternatives is provided below.

2.3.1 No Action

No action with regard to the proposed action would be equivalent to a decision by DOE not to follow through on its acceptance of the BSC proposal for cost-shared funding of the coke oven gas cleaning technology project at the Sparrows Point Plant. If no action is taken, BSC would be forced to seek an alternative means of controlling the plant's atmospheric emissions to comply with the requirements of an Administrative Consent Order issued by the state of Maryland with regard to violations of opacity and particulate matter standards from plumes from the Coke Works (see Sect. 5.1). Further, the project would not contribute to the accomplishment of the objective of the ICCT program—to enable industry to demonstrate technologies that are capable of achieving significant reduction of SO_2 and/or NO_x emissions from existing facilities and that are more cost-effective than current technologies.

2.3.2 Delayed Action

Delaying the installation and operation of the proposed coke oven gas cleaning technology would delay the environmental benefits of compliance with the Administrative Consent Order and also delay the availability of data and information on the process, which, in turn, would delay the commercial application of the technology. Further, delay of action would not be consistent with the framework and schedule of demonstrations defined by the CCTDP (see Fig. 1) and would not immediately contribute to the accomplishment of the objectives of the program.

2.3.3 Alternative Sites

In its selection of proposals for funding by the ICCT program, DOE considered the technical and environmental merit of the proposals. In the PON, DOE did not define limits for the location of the proposed demonstrations; therefore, proposals were received for projects located across the United States. Because the BSC proposal was designed to retrofit the Sparrows Point Plant, off-site alternative sites were not a viable consideration within the BSC proposal. Furthermore, the BSC proposal was intended not only to demonstrate an important technology for future commercial application but also to enable BSC to achieve compliance with an Administrative Consent Order (see Sect. 5.1) issued by the state of Maryland for control of emissions from the Sparrows Point Plant.

An on-site alternative to the proposed location of the demonstration at the "B" Coal Chemicals Plant would be to locate it at the "A" Coal Chemicals Plant. The "B" plant was chosen for the project because both its layout and the condition of existing equipment were better suited to the installation of the new system.

2.3.4 Alternative Technologies

Other commercially available hydrogen sulfide removal technologies could be used at the Sparrows Point Plant to treat the coke oven gas. Similarly, the existing coke oven gas cleaning process could be expanded to treat the entire gas stream rather than the 60% of the stream currently treated. However, if an alternative technology or full stream treatment with the existing process were chosen, the data and information to be gained by demonstration of the proposed technology would not be realized. The proposed process was selected because of its potential for economic and environmental improvement over existing technology.

3. THE AFFECTED ENVIRONMENT

3.1 NATURAL ENVIRONMENT

3.1.1 Climate and Air Quality

3.1.1.1 Climate

The climate of the Baltimore area can be characterized as continental because of the general flow of winds from west to east that brings air from the inland portion of the continent. Temperature varies considerably during the year, but precipitation is evenly distributed with an annual total of about 42 in. (107 cm). The area experiences four well-defined seasons. Severe weather usually occurs during the late spring and summer in the form of thunderstorms.

Prevailing winds are from the west in the Baltimore area. The average wind speed is approximately 9 miles (20 km) per hour, with highest wind speeds generally occurring in the winter and spring. Annual frequencies of wind direction and speed at nearby Baltimore/ Washington International Airport are depicted in a wind rose (Fig. 8). In this graph, the frequency of wind blowing from each direction is plotted as a bar that extends from the center of a circular diagram. Wind speeds are denoted by bar widths; the frequency of wind speed within each wind direction is indicated according to the length of the bar. Note that the points on the wind rose represent the directions from which the winds originate.

The Chesapeake Bay has a significant impact on the micrometeorology in the immediate vicinity of Sparrows Point. A land-sea atmospheric circulation is frequently established, which results in wind blowing from the bay during the day and toward the bay at night. The sea breeze in the daytime keeps temperatures cooler at the site than at similar inland areas.

3.1.1.2 Air quality

National Ambient Air Quality Standards (NAAQS) exist for the following criteria pollutants: particulate matter [less than or equal to 10 μm in diameter (PM_{10})], sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), and lead (Pb); Maryland has adopted the NAAQS as the state standards (Table 4). The Sparrows Point Plant is located in the southeastern corner of Baltimore County, which is in attainment with NAAQS for all pollutants except O_3 and PM_{10} (Ed Carter, Maryland Air Management Administration,

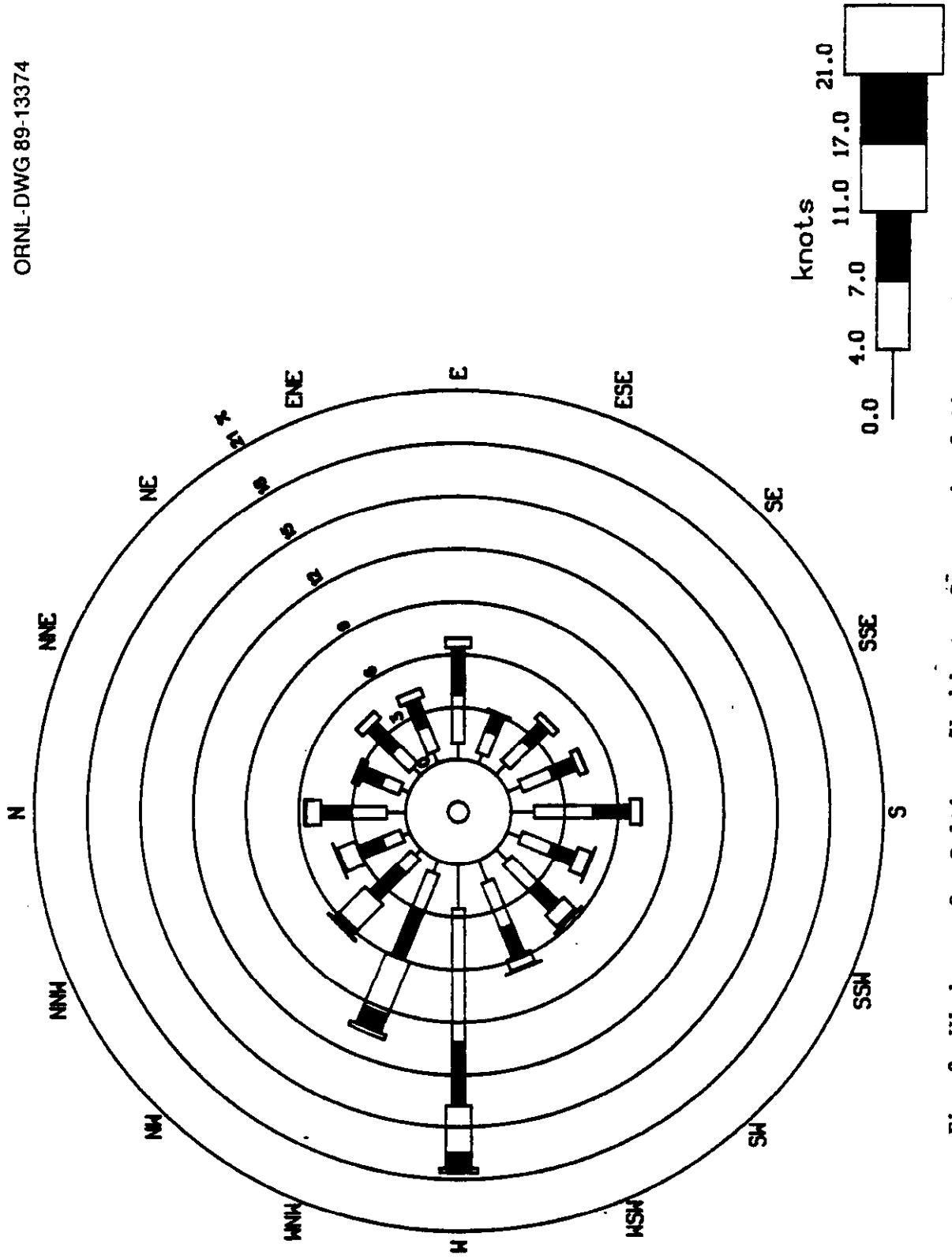

Fig. 8. Wind rose for Baltimore/Washington International Airport, 1969-73.

Table 4. National Ambient Air Quality Standards adopted by the state of Maryland

Pollutant	Averaging period	Standards ($\mu g/m^3$) Primary[a]	Secondary[a]
Particulate matter ≤10-μm diam	Annual (arithmetic mean)	50	50
	24-h[c]	150	150
Sulfur dioxide	Annual (arithmetic mean)	80	
	24-h[c]	365	
	3-h[c]	1,300	
Nitrogen dioxide	Annual (arithmetic mean)	100	100
Ozone	1-h[d]	235	235
Carbon monoxide	8-h[c]	10,000	10,000
	1-h[c]	40,000	40,000
Lead	Calendar quarter	1.5	1.5
Gaseous fluoride[e]	24-h	1.2	1.2
	72-h	0.4	0.4

Source: 40 CFR Pt. 50; 40 CFR Pt. 52, Subpart V.

[a]Primary standards are set to protect human health; secondary standards are set to protect human welfare (e.g., livestock, vegetation, economic value of objects).

[b]Not to be exceeded more than three days in three years when data are adjusted to an everyday sampling schedule.

[c]Not to be exceeded more than once per year.

[d]Expected number of days in which one or more hourly ozone concentrations exceed this value must be less than or equal to 1.

[e]Applies to state of Maryland only.

personal communication with R. L. Miller, ORNL, May 3, 1989). Nonattainment for O_3 is currently experienced in many urban regions throughout the United States as a consequence of complicated photochemical reactions in the atmosphere involving emissions of hydrocarbons and NO_x from many sources. In addition to O_3, the Sparrows Point area is in nonattainment for the secondary total suspended particulate standards that were replaced on July 31, 1987, with the current PM_{10} standards. Although the area's attainment status for PM_{10} has not yet been designated by the EPA, the Maryland Air Management Administration (AMA) anticipates that the area will be labeled a Group III PM_{10} area, indicating that there is a less than 20% probability that the area will violate the PM_{10} standards. Although a portion of the nearby city of Baltimore is in nonattainment for CO, the Sparrows Point area is in compliance.

No ambient air monitoring of criteria pollutants is conducted at the Sparrows Point Plant (Erroll B. Hay, BSC, personal communication with R. L. Miller, ORNL, May 3, 1989).

3.1.2 Surface Water Resources

The Sparrows Point Plant lies along the northern shore of the Patapsco River estuary, about 2 miles (4 km) west of Chesapeake Bay; this portion of the estuary is the Outer Baltimore Harbor. The discharge point for treated Coke Works wastewater (designated Outfall 021) is located immediately east of the treatment facility, at the southeast corner of the Sparrows Point peninsula (Fig. 9).

The Port of Baltimore is one of the world's leading seaports, and heavy cargo traffic uses Brewerton Channel, approximately 1700 ft from the Sparrows Point Plant. Three ship channels serve Sparrows Point from the main channel. Almost continual dredging and filling operations have occurred in the harbor over the years (Regional Planning Council 1982). Generally, the water quality of Baltimore Harbor degrades with distance upstream from the mouth. Pollutants come from nonpoint sources (urban stormwater runoff, landfill leachate, and residential septic tank seepage) and from point sources (industrial and municipal waste discharges.) Water quality in the harbor has improved since the late 1960s and early 1970s with increased control of point source discharges. EPA (1983) documented a significant reduction from 1970 to 1980 in loadings of heavy metals entering Baltimore Harbor from the BSC plant and other industrial

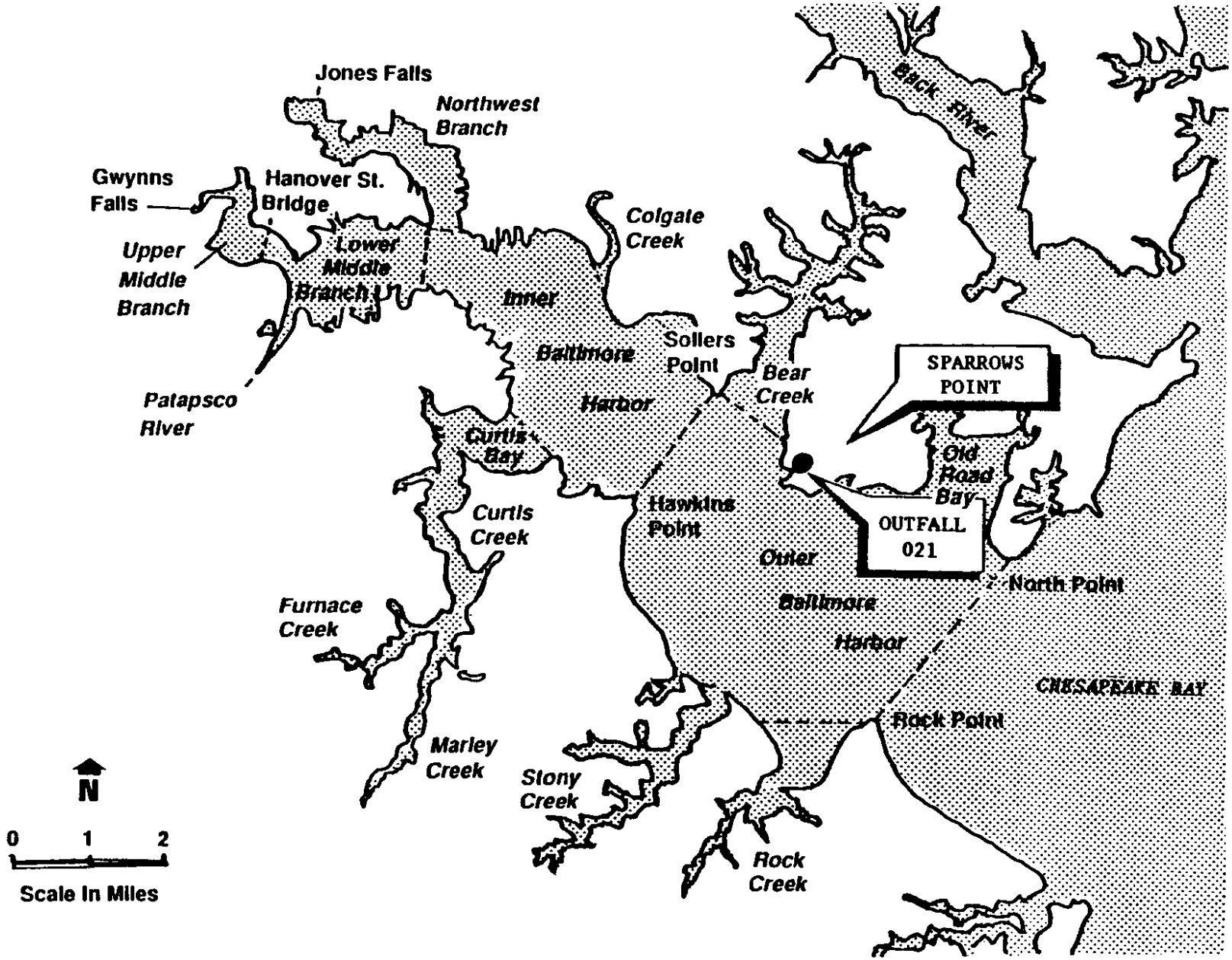

Fig. 9. Surface water resources in the vicinity of the Bethlehem Steel Corporation, Sparrows Point Plant. *Source:* Adapted from "Environmental Information," *The Coke Oven Gas Cleaning Project at the Bethlehem Steel Corporation, Sparrows Point Plant*, Vol. 4, Environmental Resources, Inc., April 21, 1989.

sources. However, toxic pollutants in sediments remain a significant problem for the harbor's water quality. The Patapsco estuary has been identified as one of three priority areas in Chesapeake Bay for the implementation of more stringent control of toxic pollutants in industrial and municipal discharges (EPA 1983).

The Maryland Department of the Environment (MDE) has designated the water of Baltimore Harbor as Class I, which is protected for water-contact recreation and for fish, other aquatic life, wildlife, and water supply. The water quality criteria for Class I waters require a dissolved oxygen concentration > 5.0 mg/L and include specific toxic material criteria for four pesticides, benzidine, and polychlorinated biphenyls (Table 5).

Under Sect. 304 (l) of the Clean Water Act (CWA) of 1987, the MDE has identified water bodies that do not meet their water quality goals because of point source discharges of toxic substances. MDE (1988) has placed Baltimore Harbor on its preliminary list of waters impaired by toxic pollutants and has identified the Sparrows Point Plant as a potential contributor of toxic materials in toxic amounts.

Wastewater is treated by biological oxidation in a treatment plant at the Coke Works. Treated water is discharged to Baltimore Harbor at Outfall 021. Table 6 identifies the effluent limitations and monitoring requirements for this outfall that are defined in the NPDES permit for the Sparrows Point Plant (ERM 1989). The NPDES permit limitations for phenols and ammonia are based on the CWA requirement that Best Available Technology (BAT) be applied. BSC has requested a variance from this requirement, in accordance with Sect. 301(g) of the CWA, which applies to non-conventional pollutants in cases where BAT is deemed unnecessary for attainment of water quality standards. While EPA evaluates BSC's variance request, interim effluent limitations that are 4 to 6 times less stringent are in effect.

The discharge from the Coke Works wastewater treatment plant has historically met the interim effluent limitations (Table 7). The typical composition of the effluent discharged from Outfall 021 is provided in Table 8. Toxicity testing of the discharged effluent has indicated no acute toxicity but some chronic toxicity; MDE suspects that ammonia might play an important role in this (ERM 1989).

3.1.3 Groundwater

There are two significant aquifers in the Sparrows Point region. One is a near-surface, unconfined aquifer with a shallow water table, and the other is a deep, confined aquifer. In an

Table 5. Water quality criteria applicable to Class I waters (state of Maryland)

Property	Criteria
Bacteriological	There may not be any sources of pathogenic or harmful organisms in sufficient quantities to constitute a public health hazard. A public health hazard will be presumed: (i) If the fecal coliform density exceeds a log mean of 200 per 100 mL, based on a minimum of not less than five samples taken over any 30-d period; (ii) If 10% of the total number of samples taken during any 30-d period exceed 400 per 100 mL; or (iii) Except when a sanitary survey approved by the Department of the Environment discloses no significant health hazard, §D (3)(a)(i) and (ii) does not apply.
Dissolved oxygen	The dissolved oxygen concentration may not be less than 5.0 mg/L at any time.
Temperature	(i) The maximum temperature in accordance with §F of this regulation or with COMAR 26.08.03.03 may not exceed 90°F (32°C) or the ambient temperature of the surface waters, whichever is greater. (ii) thermal barrier that adversely affects aquatic life may not be established.
pH	Normal pH values may not be less than 6.5 or greater than 8.5.
Turbidity	(i) Turbidity may not exceed levels detrimental to aquatic life. (ii) Turbidity in the surface water resulting from any discharge may not exceed 150 units at any time or 50 units as a monthly average. Units may be measured in Nephelometer Turbidity Units, Formazin Turbidity Units, or Jackson Turbidity Units.

Table 5 (continued)

Toxic materials	Toxic materials criteria are established to protect freshwater aquatic life, saltwater aquatic life, or human health. The toxic materials listed below may not exceed these designated limits in any waters of this state: (a) Aldrin-dieldrin — 0.003 μg/L; (b) Benzidine — 0.1 μg/L; (c) DDT — 0.001 μg/L; (d) Endrin — 0.004 μg/L; (e) Polychlorinated biphenyls (PCBs) — 0.001 μg/L; (f) Toxaphene — 0.005 μg/L.

Source: Maryland Statute, COMAR 26.08.02.01.

unconfined aquifer, there is no impermeable barrier to separate the water table from surface water bodies. In contrast, a confined aquifer is hydraulically isolated from other aquifers and surface water bodies by thick and impermeable strata. According to the U.S. Geological Survey (USGS 1988), near-surface, unconfined aquifers are generally far more susceptible to contamination from the surface than are deeper, confined aquifers.

The near-surface, unconfined aquifer system at Sparrows Point consists of upper Cretaceous Potomac Group strata (the Patapsco Formation) and Pleistocene/Holocene sediments. These units are hydraulically connected and form a single aquifer system. The Patapsco Formation consists of sand beds interlayered with thin, discontinuous clay and silt beds; it is about 300 ft (90 m) thick in the vicinity of Sparrows Point, but it is completely eroded out in the channel of the nearby Patapsco River. Pleistocene/Holocene sediments are a mixture of gravel, sand, silt, and clay; they are about 30 ft (9 m) thick beneath Sparrows Point but are considerably thicker in the channel of the river.

Table 6. Effluent limitations and monitoring requirements for Outfall 021 at the Bethelem Steel Corporation, Sparrows Point Plant[a]

Constituent	Effluent limitations (lb/d)				Monitoring requirements[b]	
	Avg.	Max.	Monthly avg.	Daily max	Measurement frequency	Sample type
Flow	N/A[c]	N/A	[d]	[d]	Continuous	Recorded
Total suspended solids	2837	5481	[d]	[d]	2/week	24-h composite
Oil and grease	N/A	708	N/A	[d]	2/week	3 grabs in 24 h
Phenols (4AAP)[e]	2.9	8.7	[d]	[d]	5/week	24-h composite
Ammonia as nitrogen[e]	1968	4724	[d]	[d]	2/week	24-h composite
Total cyanide	75.8	138	[d]	[d]	2/week	24-h composite
Benzene	N/A	0.69	N/A	[d]	1/month[f]	24-h composite
Naphthalene	N/A	0.69	N/A	[d]	1/month[f]	24-h composite
Benzo(a)pyrene	N/A	0.69	N/A	[d]	1/month[f]	24-h composite
GC/MS acid fraction organics[g]	N/A	N/A	[d]	[d]	1/month[f]	24-h composite

[a]Beginning on the effective date of the permit and lasting through the expiration date, the permittee is authorized to discharge from Outfall 021, monitoring point 121, consisting of coke oven wastewater. Such discharge shall be limited and monitored at discharge from coke oven wastewater treatment plant to Outfall 021 by the permittee as specified.

[b]The pH shall be monitored twice per week by grab sample but shall not be limited at this point.

[c]N/A = not applicable.

[d]Monitoring required without limits.

[e]These are interim limitations; the permittee has requested a 301(g) variance for these pollutants. EPA has decided to stay the Best Available Technology limits (346.4 lb/d average and 1176.4 lb/d maximum for ammonia, 0.69 lb/d average and 1.38 lb/d maximum for phenols) pursuant to Section 301(j) of the Clean Water Act. Until the expiration of the stay, the permittee must comply with the alternate limits.

[f]After 1 year following the date on which the final effluent limitations become effective, the monitoring frequency may be reduced to 1/quarter, provided that permittee has consistently complied with the effluent limitations.

[g]This requirement is effective only if and when a Section 301(g) variance for phenol (4AAP) is granted.

Table 7. Monthly average daily loadings (in 1987) of phenol, ammonia, and cyanide from the Coke Works wastewater treatment plant at Bethlehem Steel Corporation, Sparrows Point Plant[a]

	Phenol[b]	Ammonia as nitrogen[b]	Total cyanide[b]
January	0.5	804	3.6
February	0.9	855	2.3
March	1.0	877	3.8
April	0.8	788	2.1
May	0.4	544	1.9
June	0.7	455	4.2
July	0.6	783	2.7
August	0.8	973	2.9
September	1.4	508	3.5
October	1.5	555	2.2
November	1.1	550	3.3
December	1.5	451	2.3

[a]Units are average lb/d.

[b]NPDES interim effluent limitations are 2.9 lb/d for phenols, 1968 lb/d for ammonia, and 75.8 lb/d for total cyanide.

The quality of groundwater in the unconfined aquifer is generally poor at Sparrows Point. Potomac Group aquifers in the south-central Baltimore area became contaminated with saltwater as a result of large withdrawals of groundwater for industrial use between 1900 and 1950. Most industries in the Baltimore area now use potable water from the public water supply, which is a surface-water reservoir system (USGS 1988). A recently completed study by Chapelle (1985) concluded that water quality was unlikely to improve significantly even if all groundwater pumpage in the Baltimore area were stopped.

The deeper, confined aquifer at Sparrows Point is the lower Cretaceous Patuxent Formation. This formation is about 300 ft (90 m) thick, and it consists of interfingered fine- to medium-grained sand, gravel, silt, and clay. The Patuxent aquifer is a source of potable water in the Baltimore area. At Sparrows Point, BSC has only one active (and several inactive) water supply well(s) in the Patuxent aquifer. The active well is located 0.5 miles (0.8 km) north-northeast of the project site, and it provides 200-300 gpm of boiler feedwater (Chapelle 1985). Although the water quality of the Patuxent aquifer is highly variable in the Baltimore

Table 8. Composition of treated coke plant wastewater from the Coke Works at Bethlehem Steel Corporation, Sparrows Point Plant[a]

Constituent	Concentration (mg/L)
Chemical oxygen demand	490
Total organic carbon	51.5
Total suspended solids	278
Ammonia as nitrogen	119
pH, units	7.0-7.1
Nitrate as nitrogen	<0.1
Total organic nitrogen	1.4
Oil and grease	2.3
Phosphorus, total as phosphorus	0.33
Sulfate	825
Aluminum	1.5
Magnesium	10.5
Manganese	0.09
Arsenic	0.02
Cadmium	<0.05
Chromium	0.09
Lead	0.25
Mercury	0.001
Nickel	<0.1
Selenium	0.08
Zinc	0.09
Cyanide	1.78
Phenols, total	<0.01
Bis(2-ethyl-hexyl)phthalate	0.036
Di-N-octyl-phthalate	0.013

[a]Data based on one analysis, as reported on U.S. Environmental Protection Agency's National Pollutant Discharge Elimination System Form 2C to the Maryland Department of the Environment, 1987. All other priority pollutants were below the limit of detection. Effluent flow was 0.75 million gallons/d.

Source: Appendix A, Environmental Resources Management, Inc., *Environmental Information Volume for the Coke oven Gas Cleaning Project at the Bethlehem Steel Corporation, Sparrows Point Plant,* April 21, 1989.

area (Chapelle 1985), at Sparrows Point the quality is generally good. Relatively low chloride concentrations suggest that it has not been significantly affected by brackish water encroachment caused by excessive pumping (ERM 1989).

The Arundel Clay, which separates the Patapsco formation from the Patuxent formation beneath the Sparrows Point Plant, is a dense plastic clay with thin layers of silt and sandy silt. It is approximately 100 to 150 ft (30 to 45 m) thick at Sparrows Point, but it is partially eroded out and replaced by Pleistocene/Holocene sediments in the channel of the adjacent Patapsco River. Across the Patapsco River from the Sparrows Point Plant about 10 km (6 miles) away, the Patuxent aquifer is unconfined. Spatial relationships between the Arundel Clay, adjacent aquifers, and the Patapsco River are illustrated in Fig. 10.

The Arundel Clay is relatively impermeable and thus prevents hydraulic communication between the Patapsco and Patuxent aquifers except where the clay has been completely removed by channel erosion or penetrated by poorly constructed wells. The thick section of Arundel Clay between the unconfined and confined aquifers at Sparrows Point significantly reduces the groundwater contaminants moving from one aquifer to the other. Thus, the industrial activities at the surface and the pumping of groundwater from the near-surface aquifer would not be expected to affect the deeper Patuxent aquifer.

3.1.4 Terrestrial Ecology

The site of the proposed project consists of 8.6 acres (3.5 ha) located well within the boundaries of the existing steel plant. The project site was created by filling shallow water and low areas with slag, and neither soil nor vegetation is found there. Because there is no suitable habitat, no native fauna are found there except possibly an occasional transient. Consultation between DOE and the U.S. Fish and Wildlife Service (FWS) indicates that there are no federally proposed or listed endangered and threatened terrestrial species and no proposed or designated critical habitats on or near the project site.

3.1.5 Aquatic Ecology

No freshwater habitats are found at or near the proposed site. The Sparrows Point Peninsula extends into the Patapsco River estuary, which is part of Baltimore's Outer Harbor. The Patapsco River is severely impacted in terms of both water and sediment quality (see Sect. 3.1.2) and has lost many of its biotic resources because of habitat alteration (e.g., dredging to

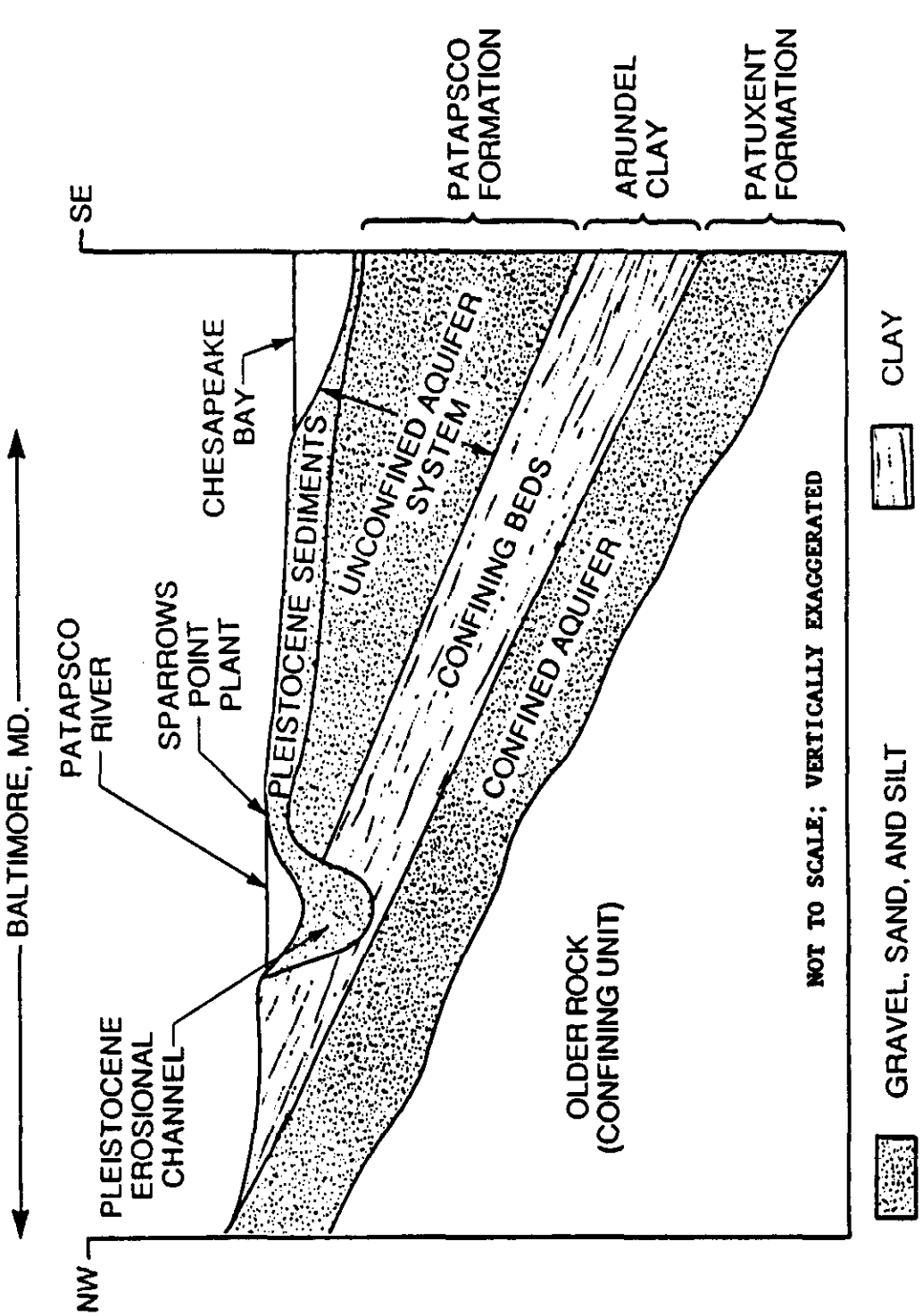

Fig. 10. Geologic cross section from central Baltimore through Sparrows Point. *Source:* Based on data from "Environmental Information," *The Coke Oven Gas Cleaning Project at the Bethlehem Steel Corporation, Sparrows Point Plant*, Vol. 4, Environmental Resources, Inc., April 21, 1989.

(5 km) of the project s
Point Country Club, ar

3.2.1.2 **Population and**

The Sparrows I
southeast of downtown
Baltimore Metropolitar
population in Baltimor

fuel-bound nitrogen content or heating value of the coke oven gas. Similarly, the proposed project is not expected to eliminate the odor associated with the coke ovens at the Sparrows Point Plant (Ronald E. Lipinski, Maryland AMA, personal communication with R. L. Miller, ORNL, March 30, 1989). The project may result in a slight improvement, but because the existing odor probably is associated to a large extent with the coke oven batteries themselves rather than the coke oven gas stream, the change is anticipated to be minimal.

During start-up and shutdown, the H_2S and NH_3 removal and recovery units would not be as efficient as during normal operation, which would result in higher concentrations of these compounds in the coke oven gas that exits the cleaning system and is combusted in plant processes. Therefore, SO_2 and NO_x emissions from in-plant combustion of the coke oven gas would also increase correspondingly. The H_2S and NH_3 removal and recovery processes are not expected to require scheduled outages, however. The design of the gas cleaning system includes a redundant ammonia stripping column. In the event either the hydrogen sulfide scrubber or ammonia scrubbing tower were shut down and restarted, equilibrium operating conditions would be reached within a few hours (ERM 1989). A Maryland state regulation mandates that SO_2 emissions from coke oven gas must average less than 1% for a 2-h period on a plant-wide basis. Because low-sulfur coal is being used, SO_2 emissions are not expected to exceed this standard during start-up and shutdown. Therefore, these emissions are not expected to be of concern. BSC is not required to notify the state of Maryland of an outage unless the upset is anticipated to last for an extended period of time (Ralph Hall, Maryland AMA, personal communication with R. L. Miller, ORNL, September 15, 1989).

4.2 SURFACE WATER RESOURCES

4.2.1 Construction

Project construction would occur in a previously disturbed land area. Construction would not be expected to cause impacts to surface water because of the distance from the project site to the harbor [~1000 ft (305 m)], the small area that would be disturbed, the level terrain of the project site, and the use of standard erosion and sedimentation control practices during construction.

4.2.2 Operation

Potential sources of water quality impacts from operation of the demonstration project include treatment plant effluent and leakage and spills in new process areas.

4.2.2.1 Treatment plant effluent

Adverse impacts to the water quality of Baltimore Harbor would not be expected because operation of the new coke oven gas cleaning system would decrease pollutant loadings to the Coke Works wastewater treatment plant. The primary wastewater source in the new system would be the ammonia still, which would produce a waste stream containing approximately 895 lb/d phenols, 339 lb/d ammonia, 51 lb/d sulfide and 26 lb/d cyanide. Table 9 summarizes the estimated changes in average daily loadings of ammonia, cyanide, and phenols, which are the principal pollutants in waste streams from the coke oven gas cleaning systems, to the plant. The table presents total pollutant loadings, which includes those contained in streams from the ammonia still and the light oil recovery unit.

Table 9. Average daily total pollutant loadings to the wastewater treatment plant at the Bethlehem Steel Corporation, Sparrows Point Plant, in streams from the existing and proposed coke oven gas cleaning systems

	Average daily total loading (lb/d)		
	Existing system	Proposed system[a]	Percent reduction
Ammonia	1428	427	70
Cyanide	95	28	71
Phenols	1293	996	23
Sulfide	not avail.	51	--

[a]Based on operations data from the system manufacturer, Davy/Still-Otto.

Changes in the volumetric flow to the treatment plant would also occur during operation of the proposed system (Table 10). The cyanide stripper stream would be eliminated, and the flow from the ammonia still would be reduced. The stream from the light oil recovery unit and

the industrial water in-flow used as diluent prior to treatment would remain the same. The new system would add a combined blowdown stream (120 gpm) from the boiler and wet-surface air cooler, but this stream would bypass the treatment plant and would be discharged directly to Outfall 021. The total average stream flow to the Coke Works treatment plant would decrease by about 10% with the proposed technology.

Table 10. Changes in volumetric flow to the Coke Works biological wastewater treatment plant at the Bethlehem Steel Corporation, Sparrows Point Plant

Process wastewater stream	Existing flow (gpm)	Proposed flow (gpm)
Amonia still effluent	219	202
Cyanide stripper	50	0
Light oil recovery unit	35	35
Industrial water (diluent)	400	400
Total	704	637

Because of the decreased pollutant loadings to the treatment plant, effluent discharged to Baltimore Harbor during the demonstration project would be expected to have lesser concentrations of phenols, ammonia, and cyanide than at present. The composition of the effluent will not be known until operation of the new coke oven gas cleaning system begins. Nevetheless, the discharge will meet the limitations of the NPDES permit for Outfall 021, and no change in impacts to water quality is foreseen.

Upset conditions would occasionally be expected during the demonstration, although no more frequent or severe than those experienced with the existing coke oven gas cleaning system. Such upsets may result in shock loadings to the wastewater treatment system. However, because the plant was designed to treat a wastewater flow up to 1422 gpm, which is more than twice the average flow from the proposed technology, it would be expected to be capable of successfully treating increased flows or loadings due to process upsets.

4.2.2.2 Leakage and spills

Leakage and spills in new process areas will be contained in new paved and diked areas having an approximate holding capacity of 404,000 gal. Paved areas will be limited to those requiring spill and leak protection in order to minimize the accumulation of precipitation and runoff. All drainage from paved areas will flow to new or existing sumps in the Coal Chemicals plants area. From the sumps, contained liquids will be pumped to the existing excess liquor storage and filtration facilities, then processed in the new scrubbing and stripping portions of the demonstration plant. The wastewater streams from the scrubbing and stripping operations flow to the Coke Works treatment plant, and the effluent from the treatment plant is discharged to Baltimore Harbor. As mentioned earlier, the effluent will meet the limitations in the NPDES permit, and a change in water quality impacts would not be expected during the demonstration.

4.3 GROUNDWATER

Significant impacts to important groundwater resources would not result from the proposed action, because as stated in Sect. 3.1.3, potable groundwater from the deeper, confined Patuxent aquifer is isolated from industrial activities at Sparrows Point by the Arundel Clay. Therefore, industrial activities at the surface and the pumping of groundwater from the near-surface aquifer would not be expected to have any effect on the deeper Patuxent aquifer.

The unconfined, near-surface Patapsco aquifer is not a potable aquifer at Sparrows Point nor is it used as a source of industrial water. Operation would not be expected to contaminate the unconfined aquifer, because the project area would be paved and runoff or spilled liquids would be collected and treated (Sect. 4.2).

4.4 TERRESTRIAL ECOLOGY

Because no natural habitat and no threatened or endangered species occur on the site or within 1500 ft (457 m) of the proposed project, no significant impacts to terrestrial ecology are expected from either construction or operation.

4.5 AQUATIC ECOLOGY

4.5.1 Construction

The coke oven gas cleaning project would be constructed within the boundaries of the highly disturbed Sparrows Point Plant, approximately 1000 ft (305 m) from the nearest shoreline property. There are no freshwater habitats on the site, and the distance from the proposed site to the Patapsco River would prevent construction impacts to estuarine biota. A Sediment and Erosion Control Plan would be submitted to and approved by the Baltimore County Department of Public Works before any grading or construction occurs. Proper implementation of the approved plan would prevent significant impacts to aquatic resources from construction activities.

4.5.2 Operation

The proposed project would reduce cooling water requirements by approximately 24%. As a result, the existing impacts to Patapsco River biota from operation of the once-through cooling water system (e.g., effects of thermal discharges, impingement, entrainment) would be reduced. To the extent that water quality of treated wastewater is improved by the proposed project (Sect. 4.2), adverse effects to aquatic biota should also be reduced. Paving and curbing of the process area would permit the treatment of storm water that might otherwise run off into nearby surface waters and affect aquatic organisms. No significant impacts to aquatic biota are expected from normal operation of the project.

The Sparrows Point Plant has a Spill Prevention, Control, and Countermeasures Plan, which would be modified to include new operations under the proposed project. The new process area would be paved and curbed to collect spilled materials and contaminated runoff (Sect. 4.2), which would be treated prior to discharge to Baltimore Harbor. Because of these measures, significant adverse impacts to aquatic biota would not be expected from accidents during the demonstration project.

4.6 FLOODPLAINS AND WETLANDS

Because the proposed site is outside the 100-year floodplain, the project would not occupy or modify any floodplain.

Because there are no wetlands either in the area where the project would be built or close enough to be affected by construction or operation of the facility, there would be no destruction or modification of wetlands resulting from this project.

4.7 MAN-MADE ENVIRONMENT

4.7.1 Land Use

The land use required for the demonstration project would be consistent with the current use, which is heavy industry. The project would be constructed among existing facilities at the "B" Coal Chemicals Plant and would not significantly change the type of land uses on the Sparrows Plant site during construction or operation. Land uses off the Sparrows Point Plant would not be affected by the proposed action.

4.7.2 Population and Employment

The proposed action would require an estimated 202,000 work-hours for a construction period of 23 months. If these labor requirements were distributed evenly over the period, fewer than 70 full-time construction workers would be needed. After the construction period, there are no plans to hire additional workers for the operation of the new system.

The increased labor requirements during construction would be insignificant in comparison with existing employment at the Sparrows Point Plant and in the Baltimore metropolitan area. The $40 million estimated expenditures represent about 20% of commitments for capital improvements in 1989. Sufficient labor is available in the Baltimore area to meet construction requirements. No construction workers would be induced to move into the area; thus, there would be no change in local populations.

During construction, some small and temporary benefits to the regional economy would be realized from increased expenditures for labor and materials. However, the net effect on the regional economy would be insignificant relative to total employment and income in the region. There would be no long-term effects on employment or income, because no additional labor would be required during operation.

4.7.3 Transportation

A slight increase in traffic during construction would result as workers arrive and depart the site and as materials and equipment are delivered. This temporary traffic increase would represent only small fluctuations within the normal range for the Sparrows Point Plant's capital construction activities and would not be significant.

Transportation during operation would not be expected to change from existing levels.

4.7.4 Infrastructure and Public Services

Because there would be no induced change in local population, there would be no associated effect on local infrastructure and public services such as schools, roads, and police. The increased value of the plant would be approximately $40 million. However, the taxable value of the Sparrows Point Plant would not increase, because industrial equipment is exempt from local taxes.

4.7.5 Utilities

Operation of the project would increase consumption of potable and industrial water (see Table 2). Potable water requirements from the city of Baltimore would increase by about 316,000 gal (948 m^3) per month, an increase of <0.1% of the total water consumption of the entire plant. This small increased requirement for potable water from the city of Baltimore would be insignificant and would not affect water supply for other uses. Industrial water requirements would increase by about 5.3 million gal (1.6×10^4 m^3) per month, representing a net increase of about 5% of total requirements for industrial water. Sparrows Point industrial water is taken from the Back River Sewage Treatment Plant. Currently, this source of water is in abundant supply and BSC is the only user. Increased use of this water would not have significant effect on the source. Electricity and natural gas requirements would decrease during the demonstration project (see Table 2); therefore, no negative impacts are foreseen.

4.8 CULTURAL RESOURCES

Consultation with the SHPO and the Advisory Council on Historic Preservation (ACHP) has resulted in a determination that there will be no adverse effect on the eligibility of the Sparrows Point Plant for the National Register of Historic Places [G. J. Andreve (SHPO) and

D. L. Klima (ACHP) letters to R. A. Hargis, Jr., DOE- Pittsburgh Energy Technology Center, dated May 17, 1989 and June 14, 1989, respectively].

The visual effect of the project would be minimal during construction and operation. The proposed action would be a relatively small component of the plant and would be overshadowed by other much larger structures onsite.

4.9 NOISE

Increased noise would result during the construction phase from equipment, machinery, and vehicle operation. However, the proposed project site is 2 miles (4 km) from the nearest residential area, and noise during construction would attenuate with distance and would not be expected to adversely affect areas off the plant property. Noise levels during operation would be similar to those from the existing coke oven gas cleaning process; therefore, a change in impacts would not be expected.

4.10 SOLID WASTE

Construction wastes would include excavated fill material, which would be stockpiled for reuse, and abandoned equipment, which would be salvaged for scrap. Other construction rubble would be disposed of in a state-permitted landfill, possibly on-site.

The proposed project would not generate any additional wastes over existing operations other than a spent-nickel-containing catalyst. About 4.5 metric tons (5 tons) of spent catalyst would be replaced at 5- to 8- year intervals during commercial operation. The catalyst would be returned to the vendor for metal recovery or properly managed as a hazardous waste at an off-site treatment or disposal facility. All hazardous waste handling at the plant would be conducted in accordance with the plant's hazardous waste management program that incorporates the requirements of the Resource Conservation and Recovery Act (RCRA) and Hazardous and Solid Waste Amendments of 1984 (HSWA).

The proposed project would eliminate the generation of low-grade ammonium sulfate. Handling of H_2SO_4 would be eliminated, as would problems with marketing the ammonium sulfate.

5. PERMITS AND REGULATORY COMPLIANCE

5.1 AIR QUALITY

The proposed project would require a Permit to Construct and an annually renewable Permit to Operate from the Maryland AMA. The amount of information required in the permitting process would depend on several factors to be decided upon by the AMA, such as whether the project is considered a new source or a modification to an existing source. Other areas of consideration include the applicability of Maryland's VOC regulations to the project, details of applying the proposed federal emissions standard for benzene at Coal Chemicals plants, and requirements of Maryland's Toxic Air Pollutant regulations pertaining to the project. No major obstacles to the air permitting process are expected, because the project involves installation of pollution control equipment and should eliminate the violations that led to the issuance of an Administrative Consent Order (Ronald E. Lipinski, Maryland AMA, personal communication with R. L. Miller, ORNL, March 30, 1989).

An Administrative Consent Order was issued on October 30, 1987, by the state of Maryland for the Sparrows Point Plant, primarily to address the presence of condensing sulfate emissions in the plumes from the coke oven battery stacks. The white plumes are in violation of opacity and particulate matter standards. No visible emissions (other than steam) are allowed from stationary sources in the Baltimore-Washington metropolitan area (with a few exceptions, such as variances for blast furnaces). The state of Maryland has ruled that the coke oven battery stacks are subject to the "no visible emissions" regulation. Stack testing (using EPA Method 5) indicated that both stacks were in violation of particulate matter standards.

Numerous discussions regarding reduction of sulfate emissions were held between BSC and the state of Maryland. BSC tried unsuccessfully to obtain a variance from the opacity standard and subsequently agreed to attempt to comply with opacity and particulate matter standards. The deadline in the original Consent Order to demonstrate compliance was October 31, 1990. On June 19, 1989, BSC and the state of Maryland amended the Consent Order to extend the date for demonstrating compliance to March 31, 1992 (final reports of stack testing to demonstrate compliance must be submitted to AMA by this date). The state is willing to allow this extension with the proposed project because it would incorporate additional benefits

beyond merely eliminating violations that could be accomplished by using more of the existing equipment. For example, the proposed project should reduce fugitive VOC emissions and lower the probability of a spill because many valves and tanks would be eliminated. The state has examined the overall technology associated with the proposed project and believes it is sound (Ronald E. Lipinski, Maryland AMA, personal communication with R. L. Miller, ORNL, March 30, 1989). The details of the project were submitted by BSC on May 18, 1989 in the construction permit application.

5.2 WATER QUALITY

5.2.1 Stormwater Management

During construction, appropriate measures would be taken to control erosion and prevent sediment runoff from polluting nearby water bodies (COMAR 26.09.01). A Sediment and Erosion Control Plan would be submitted to the Baltimore County Department of Public Works as part of the overall county building permit application process. This plan would be approved before the start of grading or construction. BSC would also submit and obtain approval of a stormwater management plan (COMAR 29.09.02) that would also comply with the requirements for protection of the Chesapeake Bay Critical Area, the area within 1000 ft of the high tide line (COMAR 14.15.01-14.15.11). The existing Spill Prevention, Control, and Countermeasure Plan for the Sparrows Point plant would be modified to include new operations under the proposed project. BSC will pave and curb new process areas to allow collection of stormwater for treatment in the Coke Works wastewater treatment facility. This measure would prevent contaminated runoff from entering surface water or infiltrating to groundwater.

5.2.2 Wastewater Discharge

Process wastewater from operation of the proposed facility would be treated in the existing biological treatment facility and discharged through Outfall 021, as permitted under State Discharge Permit No. 79-DP-0064 (federal NPDES Permit No. MD0001201). This facility is operating in compliance with its interim effluent limitations (Sect 3.1.2). Because the proposed process would decrease the loadings to the treatment facility, the project would not

require modification of the permit. Although the proposed facility would not trigger modifications of the existing permit, other ongoing regulatory reviews could modify the NPDES permit limitations at about the time the proposed facility would come on-line. If EPA denies BSC's request for a Sect. 301(g) waiver, more stringent effluent limitations for ammonia and phenols may be imposed (see Sect. 3.1.2). Additionally, the adoption of an individual control strategy for dischargers identified under Sect. 304(l) might result in changes of the effluent limitations for the coke plant wastewater discharge (see Sect. 3.1.2). However, these actions are independent of the proposed coke oven gas cleaning facility and would not directly affect the permitting of the project.

5.3 ECOLOGY

5.3.1 Threatened or Endangered Species

Informal consultation with the FWS, in compliance with Section 7 of the Endangered Species Act, has indicated that no federally proposed or listed threatened or endangered species or proposed or designated critical habitats would be impacted by this project (John P. Wolflin, FWS, letter to G. F. Cada, ORNL, April 12, 1989). The Maryland Department of National Resources (MDNR) has also reported that there are no known state threatened and endangered species at the project site (Appendix D in ERM 1989). In addition, the National Marine Fisheries Service has determined that the project will not adversely affect the shortnose sturgeon or its habitat (Doug Beach, NMFS, letter to G. F. Cada, ORNL, September 19, 1989).

5.3.2 Floodplain/Wetlands

Because the proposed project would not occupy or modify any floodplain or destroy or modify any wetlands, a floodplain/wetlands assessment in accordance with 10 CFR Pt. 1022 (DOE Regulations for Compliance with Floodplains/Wetlands Environmental Review Requirements) would not be required.

5.4 SOLID WASTE MANAGEMENT

MDE's Hazardous and Solid Waste Management Administration issues permits for and monitors groundwater discharges; landfills; sewage sludge; and the treatment, transport, and disposal of hazardous and nonhazardous industrial wastes (USGS 1988). The on-site landfill at the Sparrows Point Plant has a state permit.

The proposed project would not generate additional wastes, other than a spent nickel-containing catalyst, which would be properly managed. The proposed project would eliminate the generation of low-grade ammonium sulfate. All hazardous waste handling at the plant would be conducted in accordance with BSC's existing hazardous waste management program at the Sparrows Point Plant which complies with all RCRA and HSWA requirements.

5.5 ARCHAEOLOGICAL AND HISTORIC RESOURCES

The National Historic Preservation Act of 1966 (Pub. L. 89 665; 16 U.S.C. 470 et. seq.), as amended, requires federal agencies to consider the effect of their actions on any property included in or eligible for inclusion in the National Register of Historic Places. Compliance, as outlined in DOE's NEPA Compliance Guide (DOE 1988), requires that such properties be identified and the effects of the project be determined in consultation with the SHPO. If this process determines that there would be an adverse effect, DOE must consult with the SHPO and notify the federal Advisory Council on Historic Preservation to determine appropriate mitigating measures.

A review prior to consultation with the Maryland Historical Trust did not reveal any properties currently included in the National Register. However, because the entire Sparrows Point Plant is potentially eligible for the National Register, DOE has consulted with the Maryland Historical Trust to determine whether the project would affect the plant as a historical resource. Consultation with the SHPO has indicated that eligibility would not be adversely affected by the proposed project (see Sect. 4.8).

5.6 COASTAL ZONE MANAGEMENT

The project is within Maryland's coastal zone and must, therefore, be consistent with the program developed under Section 307 the federal Coastal Zone Management Act of 1972 and its implementing regulations (15 CFR Pt. 930). The state has determined that the proposed

project is consistent with Maryland's coastal zone managment program (James M. Teitt, MDNR, Tidewater Administration, letter to Edward Simek, Environmental Resources Management, Inc., Annapolis, MD, July 6, 1989).

6. FINDINGS

The impacts expected from the proposed action have been evaluated relative to ten criteria specified by the CEQ (40 CFR Pt. 1508.27). The results of this evaluation follow.

1. Both beneficial and adverse impacts

The foremost beneficial effect of this project would be to demonstrate the economic viability and environmental acceptability of the coke oven gas cleaning technology for future commercial applications. Coal is a significant energy resource of the United States. This proposed action would provide coal-consuming steel manufacturing plants capable of retrofitting coke oven cleaning systems with a technology that reduces atmospheric emissions and, thus, improves air quality. For the BSC Sparrows Point Plant specifically, reduction in emissions of sulfurous compounds is expected to result in compliance with opacity and particulate matter standards in accordance with the Administrative Consent Order issued by the state of Maryland. The proposed project would also have a positive, although small and temporary, impact on the local economy during a 23-month construction period.

No adverse impacts would be expected from the proposed action.

2. Public health and safety

Public health and safety would not be affected by this project.

3. Unique characteristics of the geographical area

No parks, wilderness areas, wild and scenic rivers, refuges, or national natural landmarks are located near the site. Historic and cultural resources that have been identified can be avoided or protected to prevent significant adverse impacts.

4. The degree of expected controversy

The proposed project is not expected to generate significant public controversy.

5. Level of uncertainty of impacts or uniqueness of risks to the human environment

The proposed project has no uniqueness or uncertainty that would affect the conclusion that no significant impacts would occur to the human environment.

6. Precedent-setting nature of the proposed action

The coke oven gas cleaning project is a demonstration that involves new technology. Information has already been obtained, however, from similar systems, and the project would implement many of the known methodologies developed during the testing of those systems.

7. Contribution to cumulative impacts

There are no current activities in the region having adverse environmental impacts that, combined with the expected impacts of the proposed project, would be expected to result in significant cumulative impacts.

8. Listings of the National Register of Historic Places and important cultural or scientific objects

The Sparrows Point Plant may be eligible for nomination to the National Register of Historic Places. Consultation with the SHPO and the ACHP has indicated that eligibility would not be adversely affected by the proposed project.

9. Threatened and endangered species and their habitats

No threatened or endangered species are present on or near the proposed site, and none would be affected.

10. Violation of existing environmental laws and regulations

No environmental laws would be violated by the proposed action. Consideration has been given to the following laws and regulations in this EA: the National Environmental Policy Act, the Clean Air Act, the Clean Water Act, the Federal Water Pollution Control Act, the Resource Conservation and Recovery Act, the Hazardous and Solid Waste Amendments of 1984, the Endangered Species Act, the Fish and Wildlife Coordination Act, the Archaeological Resources Protection Act, the National Historic Preservation Act, the National Registry of Natural Landmarks, and Maryland state and local environment statutes.

Further, the proposed project would eliminate existing violations of opacity and particulate matter ambient air quality standards at the Sparrows Point Plant.

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